SEPTEMBER 19, 1931

Railway Age

FOUNDED IN 1856

GENEVA COLLEGE LIBRARY

In This Issue

Greater Use of

Machines in Maintenance Work

Will Produce Greater Economies

Article No. 11

OPERATING ECONOMY SERIES

NEXT WEEK

Article No. 12

"Motor Trucks Reduce Cost of Freight Service."

Consider these PROVEN FACTS about wood preserving

Photo courtesy
C. C. C. & St. L. Ry.

Oil provided for full volume

The actual cubical content of a pole, pile or tie is the only basis for an accurate determination of the quantity of creosote oil that should be retained in the wood. While the specified dimensions usually give a close approximation of actual volume of sawn timbers and lumber and well hewn cross ties, they do not give a proper basis for computing the cubical content of poles, piles and posts. Such round material usually averages much over the minimum specified sizes at one or both ends of the piece.

Various empirical figures for cubic contents may be used but the result might vary appreciably from actual facts.

At AmCreCo plants nothing is left to chance. Measurements are made to determine the volume of the material to be treated. Oil to be retained is determined by this volume. The oil inventories are checked to insure that not less than this quantity is left in the wood. This fundamental of treating practice insures that the customer actually receives the treatment he specifies. It has been an important feature in our 25 years of successful operation. We will gladly show you records to illustrate the advantages of using the measured content as the basis for fixing total oil retention.

AMERICAN CREOSOTING COMPANY
INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED
AMCRECO LOWRY PROCESS CREOSOTED WOOD
GEORGIA CREOSOTING COMPANY INCORPORATED

LOUISVILLE — KENTUCKY

RA 9-19 Gray

Alphabetical Index to Advertisers—Page 56 Buyers Directory of Advertisers—Page 49

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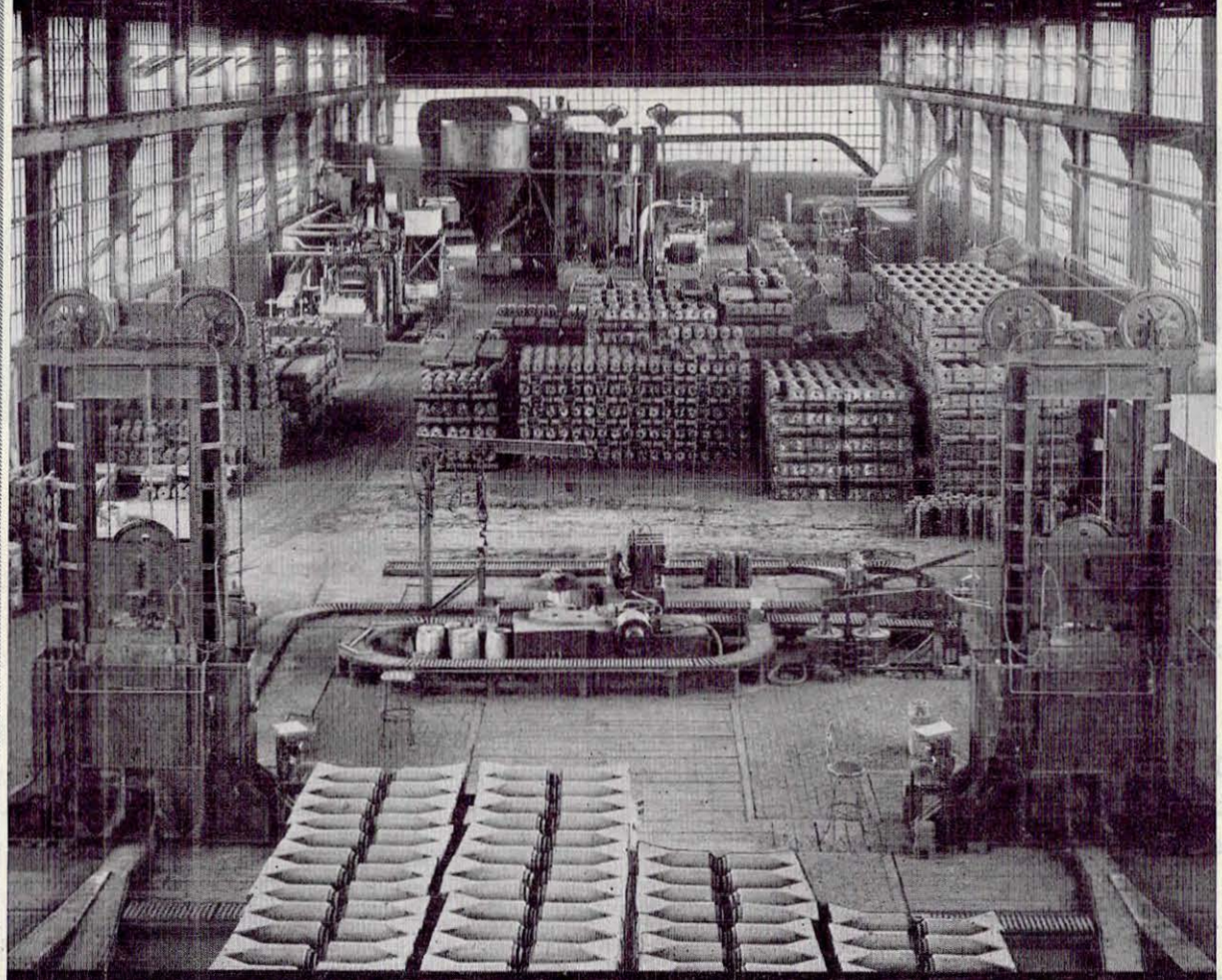
Address communications to 30 Church St., New York City.

MINER

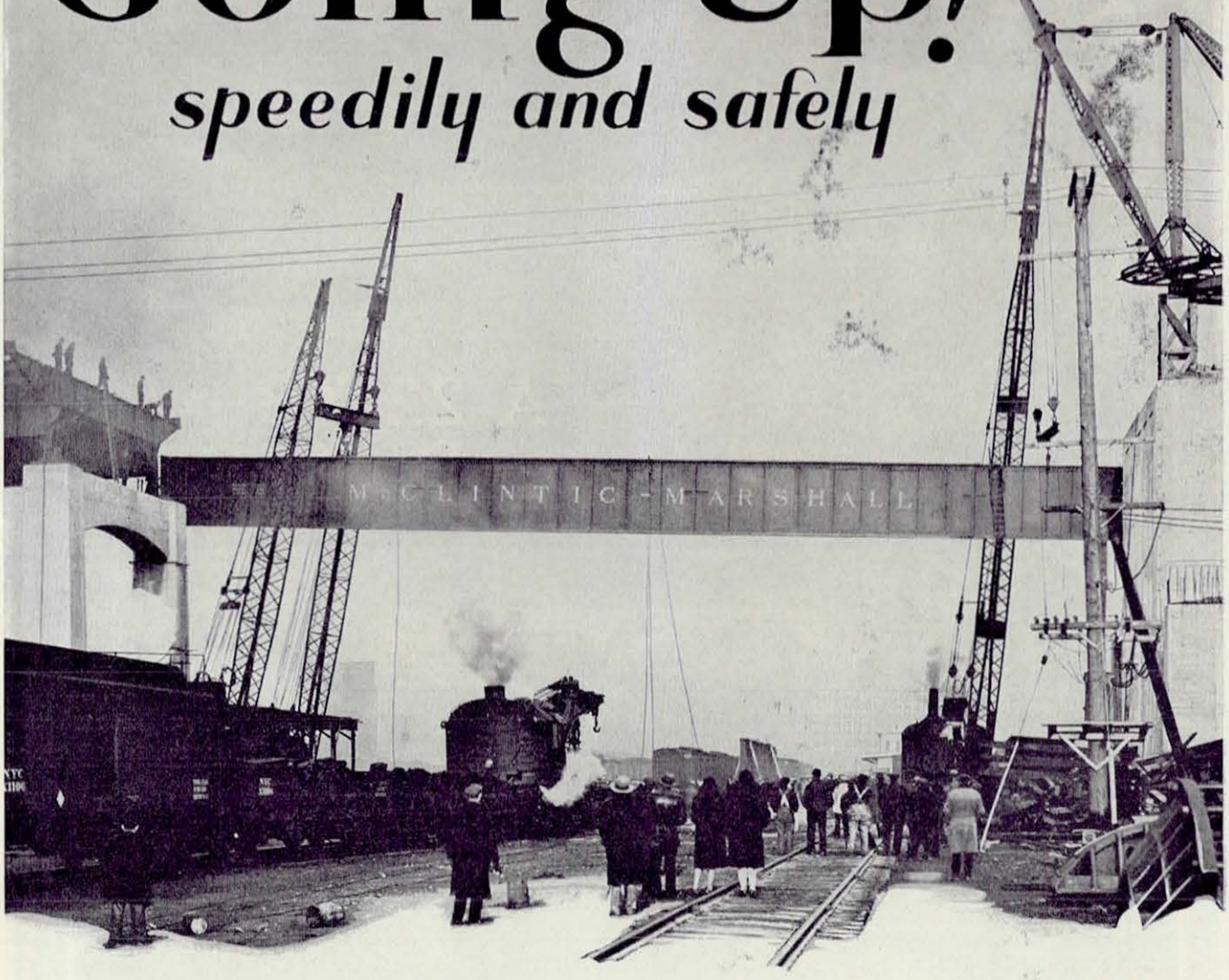
A-22-XB
Friction Draft Gear



W. H. MINER, INC. CHICAGO

Going Up!

speedily and safely



It's a spectacular sight to watch a giant girder being hoisted speedily and safely into place but the remarkable part about it is the men and the machines which make possible such a feat. The above view shows a McClintic Marshall job with three Industrial Brownhoists and a derrick placing a 154-foot, 84-ton girder into position seventy feet above the ground. This is one of the longest girders ever erected in this country.

Absolute dependability and economy of operation are essential characteristics of Industrial Brownhoist cranes—features which make them the choice of the majority of the country's leading structural erection companies, railroads, and industrial plants. To those interested in placing their handling methods on the same money saving basis, our unequalled experience and the world's most complete line of these cranes are always available.

Industrial Brownhoist Corporation, General Offices, Cleveland, Ohio

District Offices: New York, Philadelphia, Pittsburgh, Detroit, Chicago, New Orleans, San Francisco, Cleveland.

INDUSTRIAL BROWNHOIST

Published every Saturday by the Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa., with executive offices at 30 Church Street, New York

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 September 19, 1931 No. 12

In This Issue

Greater Use of Machines in Maintenance Work Will Produce Greater Economies ..... Page 428

The eleventh article in the Operating Economy Series, which points out the savings to be realized by more general adoption of power tools in the maintenance of tracks and structures.

Katy Operating Air-Conditioned Diners on Its "Texas Special" ... 437

A description of trial installations of air-conditioning equipment on three new dining cars, which have been favorably received by patrons of this road.

Charts of Earnings, Investment and Traffic for Two Decades 440

Henry M. Sperry, M. Am. Soc. C. E., analyzing railroad performance over the past 20 years, shows that freight traffic reached its peak in 1929 with revenues at a high point three years earlier; and that declining passenger traffic and growing taxes are serious present problems.

EDITORIALS

Shall Private Industry or Government Increase Employment? 425
Facing the Facts in Grade Separation 427
Inform Employees About Motor Vehicle Laws 427

GENERAL ARTICLES

Greater Use of Machines in Maintenance Work Will Produce Greater Economies 428
Railway Problem Attracts Wide Attention in Canada 432
What Junior Storekeepers Say About Supply Work 434
Katy Operating Air-Conditioned Diners on Its "Texas Special" 437
Charts of Earnings, Investment and Traffic for Two Decades, by Henry M. Sperry, M. Am. Soc. C. E. 440
New Haven Receives Ten Electric Locomotives 443
W. H. Williams Succeeds Taussig as President of Wabash 445
Freight Car Loading 446
Hearings on Railroad Practices 447
A Gas-Powered Lifting Truck 450

ODDS AND ENDS 450

NEWS 451

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

The ESSENTIALS

The purpose of a draft gear is to protect cars and lading against shocks which are unavoidable with the intensive conditions of modern railroading.

The impartial tests made by the A. R. A. Committee on Draft Gears will be of great service in guiding users to the selection of the best gear.

Many technical problems are involved in the selection of the most efficient draft gear, but the basic principals are simple.

1. . . . *Capacity:*

The essential function of a draft gear is to cushion the blow between colliding cars. The higher the capacity of the gear, the greater the blow that can be cushioned without excessive shock to the car and lading.

The EDGEWATER Draft Gear has a capacity greater than any other gear which fits into the Standard A.R.A. gear pocket.

2. . . . *Endurance:*

The endurance of a draft gear measures its ability to stand up under hard service and to continue to provide cushioning capacity.

The lubricated friction surfaces of the EDGEWATER gear ensure a long life with a minimum loss of capacity in service.

of the DRAFT GEAR

3. *Smooth Action:* It is important that a draft gear shall close smoothly under impact. The jerky action, which is common in dry friction gears subjects cars and lading to shocks out of all proportion to the blows.

The EDGEWATER gear, because of its lubricated friction surfaces, closes smoothly whether the impact takes place at high speeds or at low.

4. . . *Uniformity:* It is obviously desirable that all draft gears purchased for a given service shall be uniform in capacity and performance. The accurately rolled and thoroughly lubricated friction surfaces of the EDGEWATER gear ensure a much higher degree of uniformity than is obtainable with a dry friction gear.

5. . . . *Release:* In order to provide for constant protection, a draft gear should release quickly and positively after impact.

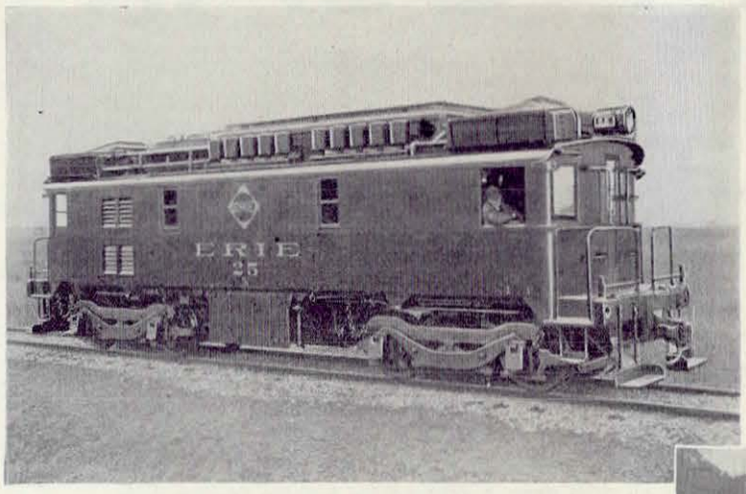
The ring spring action of the EDGEWATER gear provides for efficient release, without injurious recoil action. The friction of the EDGEWATER ring spring damps out vibration and prevents destructive surges.

6. . . *Simplicity:* No argument is needed for the advantage of simplicity. The EDGEWATER gear achieves the greatest simplicity possible. It is furnished as a single self-contained unit. No replacements or attention are required during the life of the gear and no spare parts need be carried in stock.

EDGEWATER STEEL COMPANY · PITTSBURGH

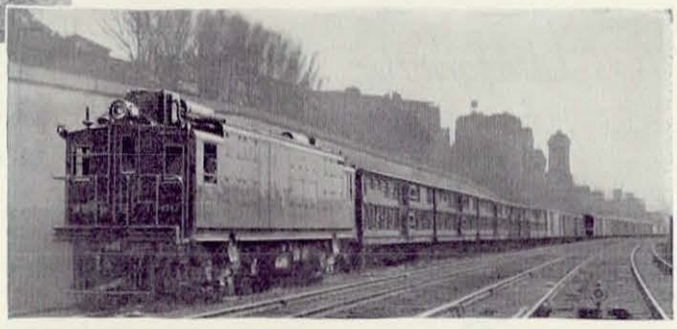
Sales Offices: ATLANTA BALTIMORE BOSTON CHICAGO LOUISVILLE NEW YORK
PHILADELPHIA PORTLAND SAN FRANCISCO ST. LOUIS ST. PAUL SEATTLE WASHINGTON

Oil- and gas-electric motive power ---- a long step forward in economical operation

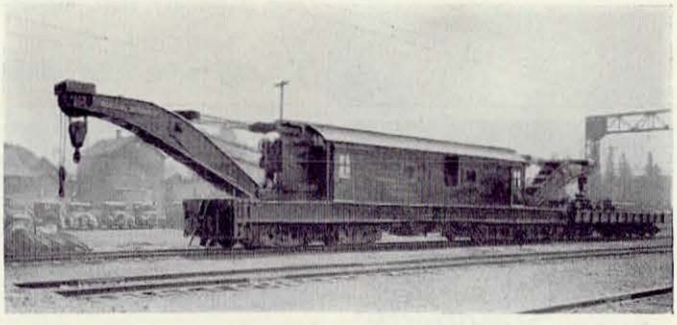


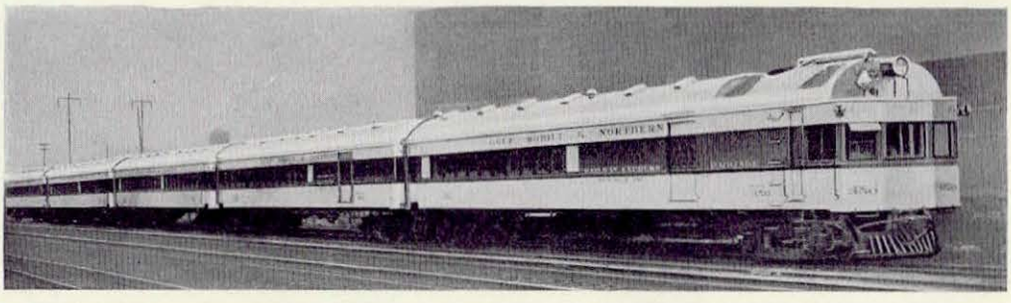
This oil-electric locomotive, recently placed in service by the Erie Railroad, is equipped with a single-unit power plant developing 800 horsepower. Four other G-E equipped oil electrics are in the service of this road.

The New York Central Railroad now has a total of 40 G-E equipped oil-electrics in service. Thirty-eight are of the 3-power type (oil-electric-battery-third-rail).



LENGTHENING an already long list of G-E equipped locomotives and rail cars, these recent installations indicate the mounting preference for oil- and gas-electric motive power. Greater horsepower per unit and better economy through improved operation have extended the usefulness of oil-electrics and gas-electrics without sacrificing their inherently high availability. Let us send you complete information. General Electric Company, Schenectady, N. Y.





This new G-E equipped, self-propelled, gas-electric wrecking crane of the Cleveland Union Terminals Co., has a capacity of 105 tons at each end. A similar unit is operated in the Electric Zone of the New York Central R.R. at New York.

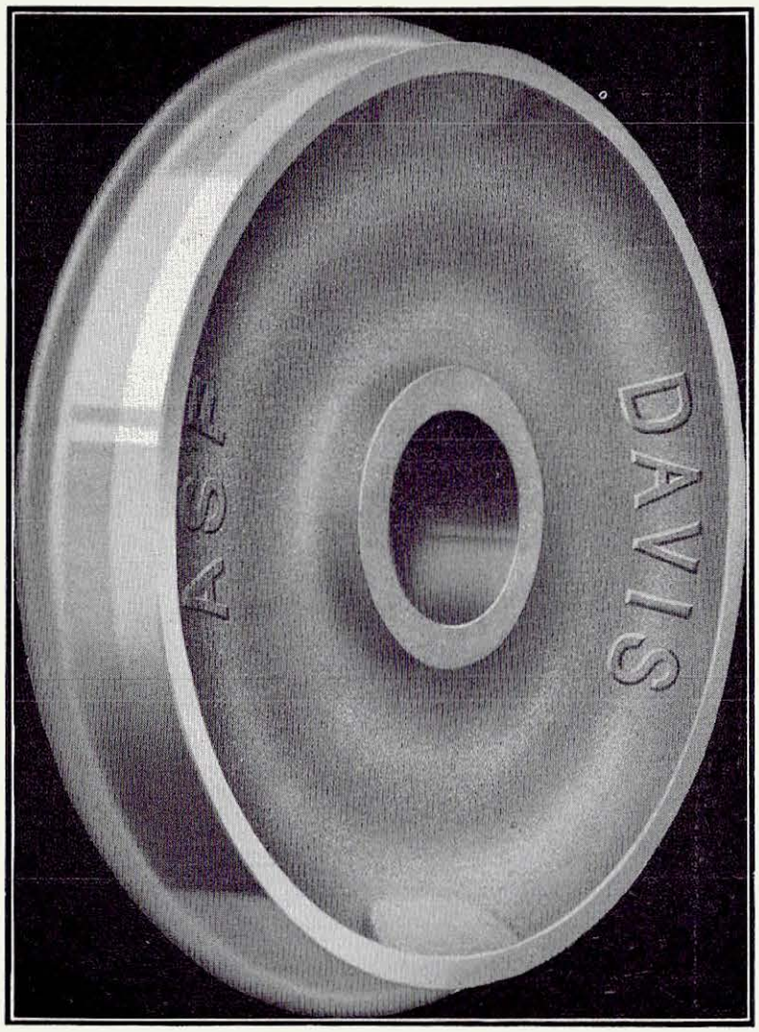
A G-E equipped gas-electric car with trailers built especially for the Gulf, Mobile & Northern Railroad. The motor car has a single-unit power plant of 535 horsepower.

350-97

GENERAL ELECTRIC

SALES AND ENGINEERING SERVICE IN PRINCIPAL CITIES

DAVIS "ONE-WEAR" STEEL WHEELS



WHY PERPETUATE AVOIDABLE REPAIR WORK?

Here is an unnecessary job that grows larger every year - wheel conditioning . . . . . .

Wheels that seek the shop for re-turning occupy the time of men and machinery unnecessarily . . . . . .

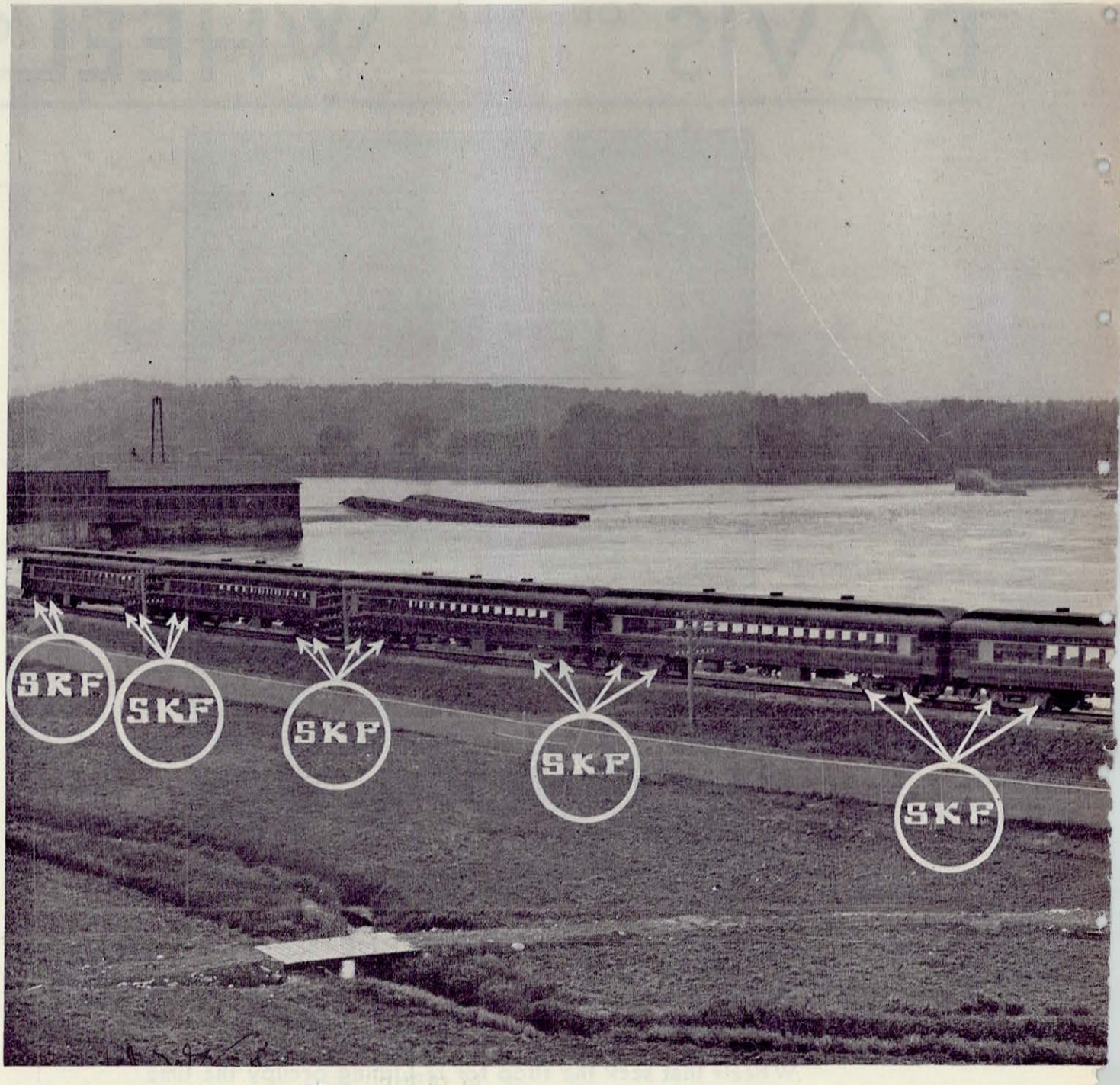
Davis "One-Wear" Wheels go through life causing no trouble, only asking to be left alone . . . . . .

Their special composition steel, triple heat treated, will abolish maintenance work . . . . . .

Use Davis "One-Wear" Steel Wheels for relief from maintenance . . . . . .

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS



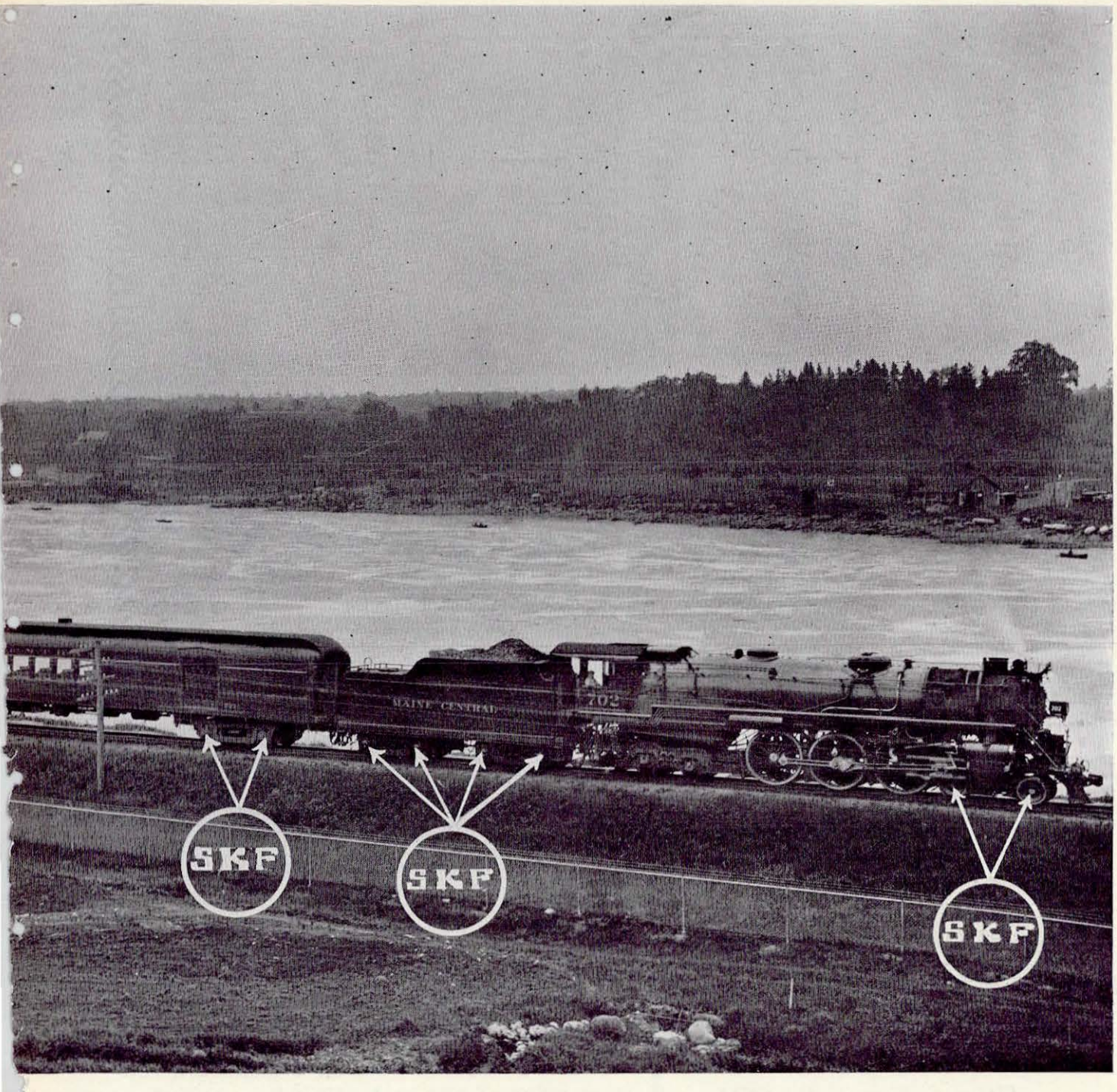
Complete SKF equipped train photographed at the famous Bangor Salmon Pool. Engine, tender and car trucks are all running on SKF Journal Bearings.

This de Luxe Passenger

IN their constantly improving service to the thousands of vacationists who patronize their lines, the Boston and Maine and the Maine Central are making liberal use of SKF Journal Bearings.

On the Boston-Bar Harbor run the de Luxe passenger equipment pictured above is modern

SKF INDUSTRIES,



Equipment Runs on SKF Bearings

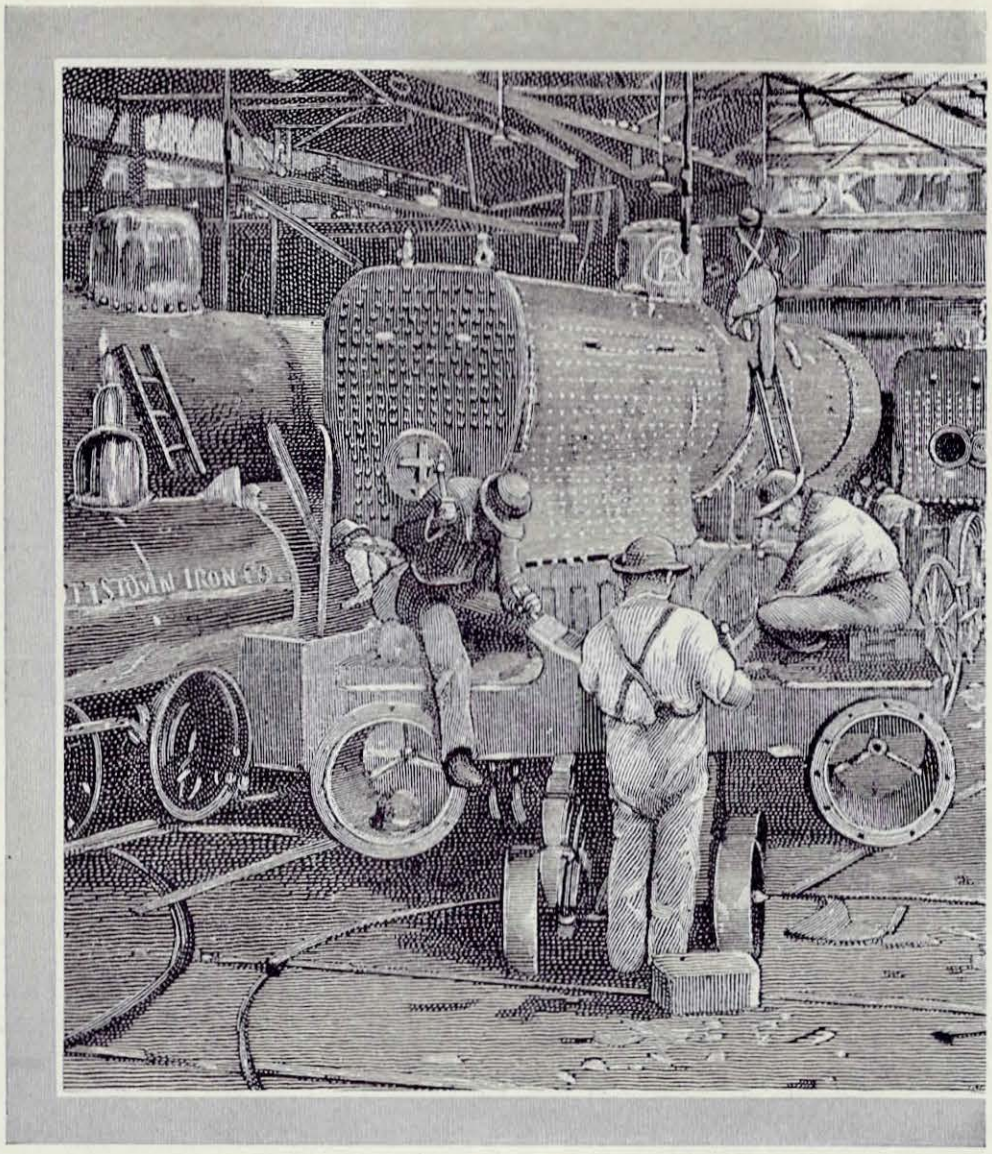
throughout—including the bearings. The SKF Journal Bearings give easy starting and greater dependability, both important to the comfort-loving passenger.

Many of the country's leading railroads have passenger equipment running on SKF Journal Bearings. These bearings have run longer than any other anti-friction bearing installed under passenger cars. Enough of them have run a million miles each to demonstrate their dependability under a wide variety of conditions.

SKF equipped cars owned by both the Boston and Maine and the Maine Central are utilized on the famous Boston-Bar Harbor run.

2772

INCORPORATED • 40 East 34th Street, New York, N. Y.



When "RAILROADING"

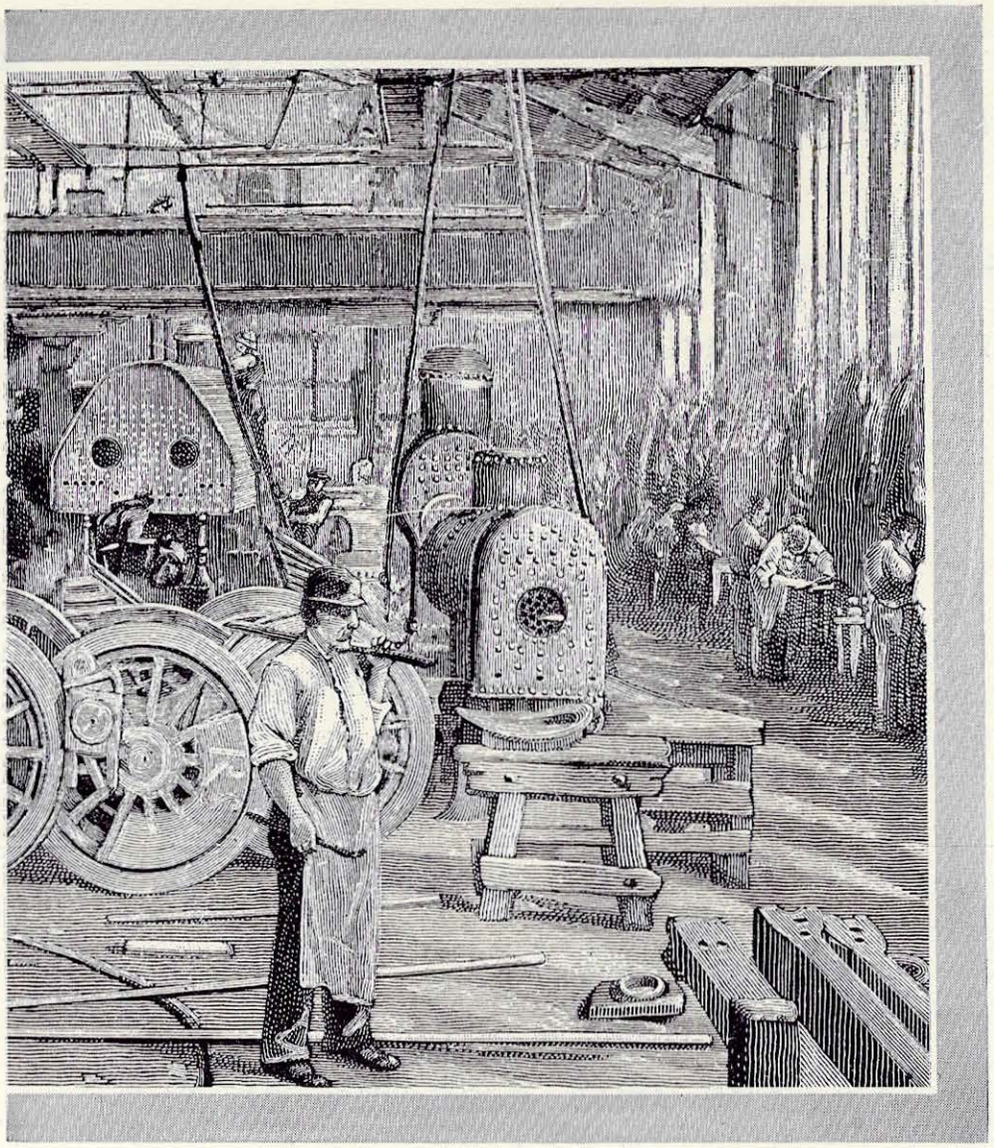
Since the early 60's Johns-Manville engineers have helped to save millions of Railroad dollars . . . .

IN the early days, railroading demanded a constant influx of new materials, ideas, inventions —for only through continual experiment could railroading progress.

And among the leaders in meeting these demands were Johns-Manville engineers whose aggressive research and development work contributed many valuable improvements.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

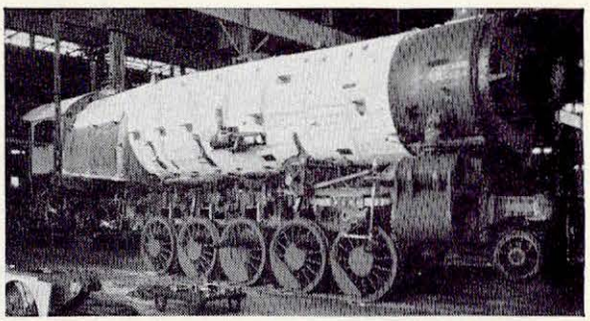


Reproduced by courtesy of Charles Scribner's Sons

A famous locomotive shop in the 60's. Every locomotive was one-third experiment—literally hammered together by hand out of iron and brass. Improvements were often devised on the spot by clever workmen.

meant "PIONEERING"

Today, in every railroad department, dozens of special materials developed by Johns-Manville are lowering costs and improving service. More than 70 years of pioneering by Johns-Manville can be credited with saving literally millions of railroad dollars annually. Address Johns-Manville, 292 Madison Ave., New York.



Johns-Manville was one of the pioneers in the development of efficient insulation for locomotives and today over 90% of all locomotives in operation are J-M insulated.

Service to Transportation

What is Economy?

"Cheapness of operation, relative or absolute, as expressed in steam, fuel, or money."

Standard Dictionary

IF physically or economically obsolete locomotives cost much more to maintain and to operate, where is the economy of prolonging their life?

The true economy of supplanting them with modern locomotives can be demonstrated in dollars and cents.

It takes Modern Locomotives to make money these days.

THE BALDWIN LOCOMOTIVE WORKS
1831 1931

THE
BALDWIN
LOCOMOTIVE WORKS
PHILADELPHIA

»» *Your* PASSENGER TRAIN CARS *can be lastingly attractive* at reasonable initial cost

IT COSTS BUT LITTLE MORE to use Armco specially processed sheets in your passenger train cars. And the smart beauty and enduring service they bring more than justify the expenditure.

Here are sheets made expressly for modern passenger train cars. They possess a smooth, flawless texture, and are exceptionally dense and uniform in composition. Moreover, they are flat, easy to work, and grip paint and other finishes in an enduring bond.

You should have complete information about Armco sheets for passenger train car construction before you invest again. Any of the offices listed below is ready to give you the facts. Write to the one nearest you.

ARMCO

RAILROAD PRODUCTS

MADE BY CONTINUOUS PROCESS

Special Car Siding Sheets
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Passenger Car Sheets and Plates
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Hot Rolled Ingot Iron and Steel Sheets

•

Wrought Steel Wheels

•

ARMCO RAILROAD SALES CO.

Executive Offices: MIDDLETOWN, OHIO

DISTRICT OFFICES:

Chicago . New York . Philadelphia . Cleveland . St. Louis

ARMCO
IRON AND STEEL
SHEETS FOR EXACTING RAILROAD USES PLATES

Boston & Maine —

NEWEST COACHES UPHOLSTERED IN

CHASE **Velmo**

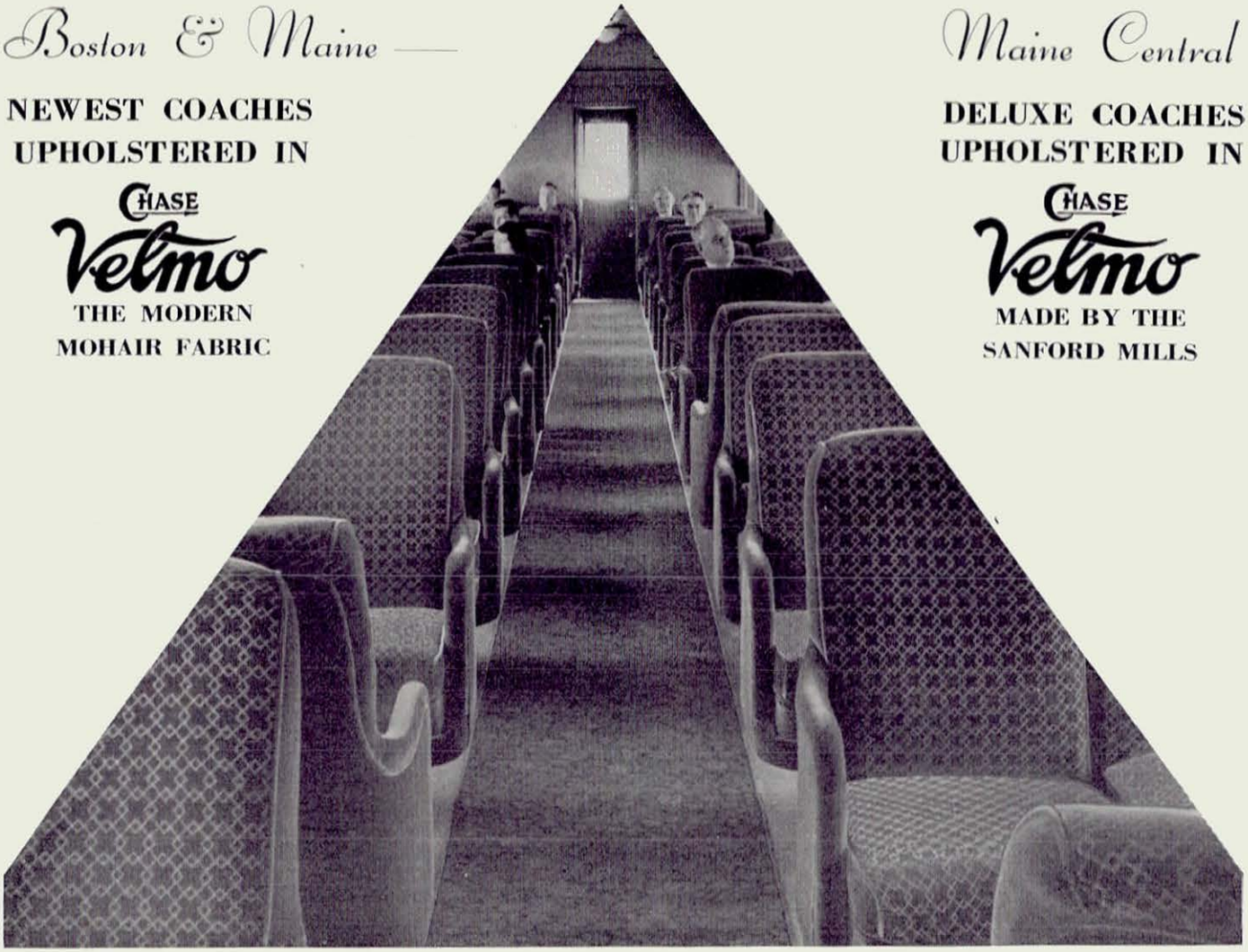
THE MODERN MOHAIR FABRIC

Maine Central

DELUXE COACHES UPHOLSTERED IN

CHASE **Velmo**

MADE BY THE SANFORD MILLS



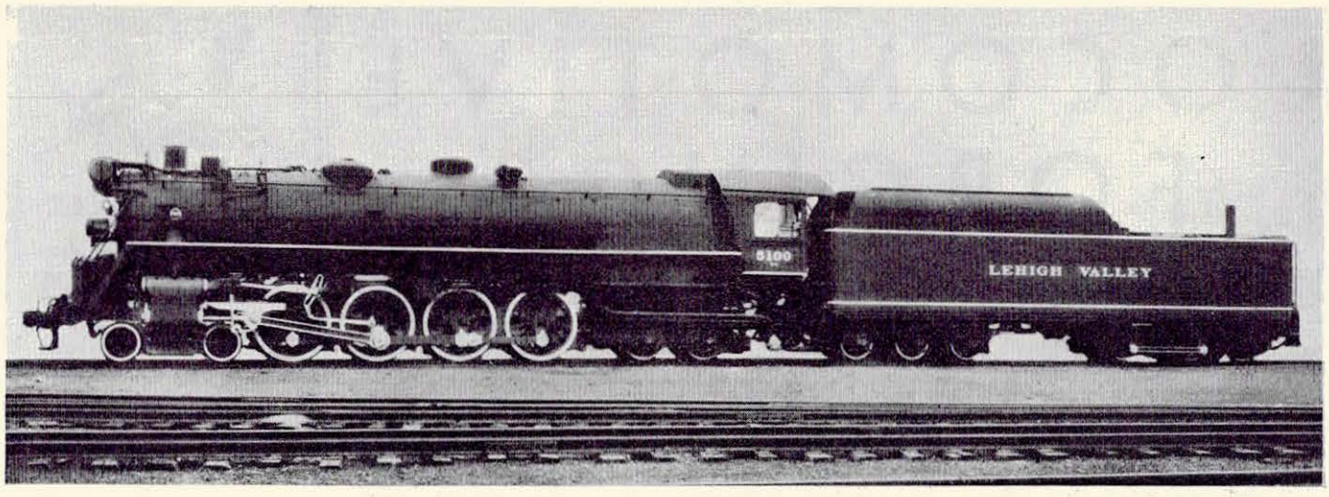
Again VELMO . . . the dependable mohair upholstery fabric . . . becomes an important factor in modern railway transportation. The true homelike atmosphere so essential to your patrons is readily achieved through use of beautiful VELMO fabrics; and at the same time practical economy is expressed to the highest degree. Luxury plus great durability are the chief characteristics of Chase Velmo.

There has been in the railway field a noticeable trend towards better decoration, and better seat arrangements. With these improvements better seat coverings are in demand . . . correctly styled, new colorings and weaves.

Therefore VELMO fabrics obtain ready acceptance by the leading decorating authorities as the upholstery material most admirably suited to meet these conditions. Many new and interesting patterns in velvets or friezes now ready for inspection.

L. C. Chase & Company, Selling Agents: Boston . . . New York . . . Detroit . . . San Francisco . . . Chicago

ONE Class of Engine

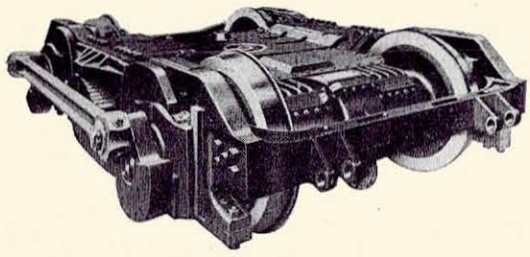


for ALL Classes of Service

It is hardly necessary to call the attention of railway executives to the manifold economies to be realized by having one class of engine that is equally effective in either fast-freight, slow-freight or passenger service.

This condition can be achieved by the use of high-wheel engines equipped with Bethlehem Auxiliary Locomotives. Not only are great economies obtained from the more efficient utilization of motive power, but these high-wheel engines are made much more effective for the fast-freight service in which they have in the past been generally used. In this case the Auxiliary makes possible the starting, without excessive wear and tear on equipment, of trains heavy enough to make full use of the engine's tremendous power at road speeds.

In passenger service the Auxiliary provides faster acceleration, and in slow-freight service it furnishes added tractive force that enables the high-wheel engine to handle the tasks of the heavy slow-freight locomotive.



The Bethlehem Auxiliary Locomotive is made in both four- and six-wheel types. It is readily installed in place of one of the tender trucks and can be cut in or cut out at will, thus providing an instantly available reserve of tractive force.

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

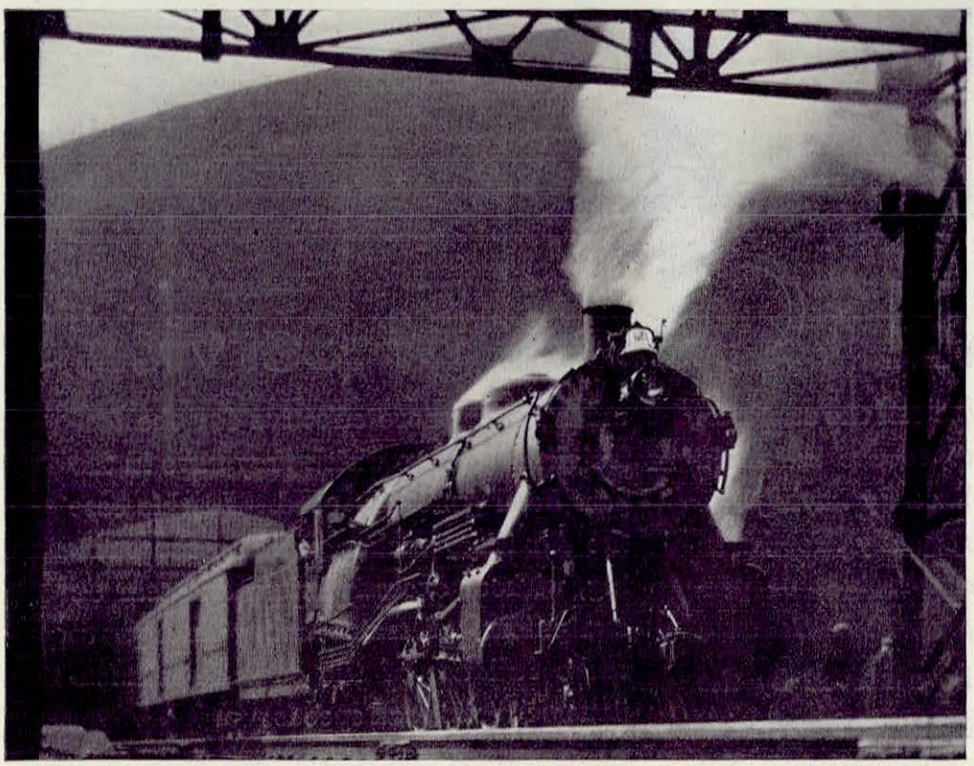
District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Buffalo, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis.

Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Seattle, Portland, Honolulu.

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City.

BETHLEHEM Auxiliary Locomotive

MIDVALE LOCOMOTIVE FORGINGS

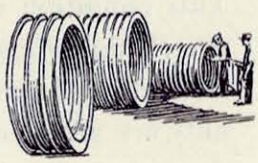


TWENTY-FOUR hours a day, three hundred sixty-five days in the year—the railroad carries on. So continuously, with so little friction, that the average citizen never stops to realize the unique skill, the exceptional industry and the supreme loyalty—of the railroad man. One "deserter" in the railroad could cause more disaster than a deserter in the army—where the penalty is death.

There is loyalty, too, in the materials that build the railroad equipment. For years, in tires, piston rods, connecting rods, crank pins and axles, Midvale Forgings have rendered a dependable service that fits in naturally with a railroader's ideas. The Midvale Company is always at the railroad's service—at any of its offices—Philadelphia, New York, Washington, Pittsburgh, Cleveland, Chicago or San Francisco.

TOOL STEEL

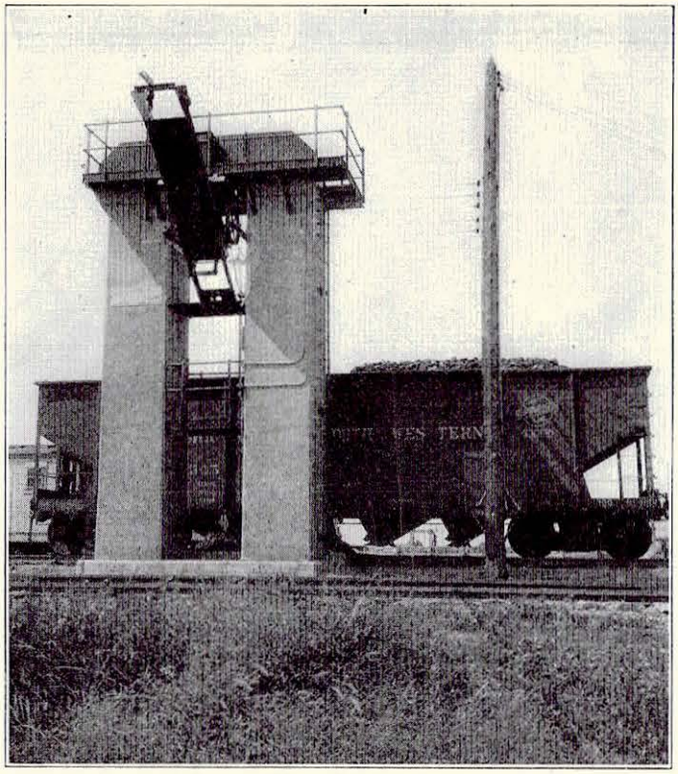
Midvale does not follow the "tonnage" method of tool steel production. Midvale charges with cold metal. Lets the ingots cool, to permit inspection for faults. Carefully chips out any cracks. Reheats ingots and reduces to billet size. Sand-blasts the scale. Again inspects and chips when necessary. Reheats and rolls to finished size. This is the only method by which tool steel of Midvale quality can be produced.



LOCOMOTIVE TIRES

Midvale tires are made of high carbon steel, actually tool steel. From the ingot clear through to the finished tires they are repeatedly tested—assuring the wear for which Midvale tires have become so well known.

This F-M conveyor type coaler handles 90 tons to the hour. Powered with a 10 hp. motor. Hopper capacity up to 50 tons.



Coal handling costs REDUCED!

On most roads there are points where hand shoveling, locomotive cranes, bucket platforms and other obsolete methods of coaling locomotives are used. Coal handling costs at such points can be reduced —often to as little as 3 cents a ton—by installing Fairbanks-Morse Automatic Coalers.

The F-M conveyor type coaler operates on the same principle as the largest coaling stations. An all-steel conveyor chain assures many years of service and a high factor of safety. Coal is delivered in a continuous stream, thus eliminating spillage and overloading.

Both conveyor and skip-hoist types are built for continuous operation and can be started or stopped from the locomotive tender or the ground. Coal can be taken on without having an attendant at the coaler as a switch is located on the apron, convenient for the train crew.

Facts about the cost-cutting possibilities of F-M Automatic Coalers are of practical interest at this time when every saving in operating expense counts more than ever before.

We will send complete information upon request without obligation to you.

• • •

F-M Full-Automatic Skip-Hoist Coaler. This type handles 50 tons to the hour, Powered with a 15 hp. motor. Hopper capacity up to 50 tons.

FAIRBANKS, MORSE & CO.

CHICAGO

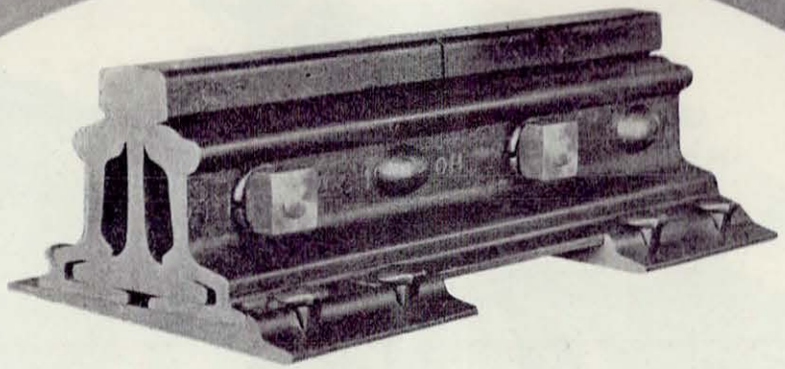
Manufacturers of railway motor cars; hand cars; push cars; velocipedes; stand pipes for water and oil; tank fixtures; stationary and marine oil engines; steam, power and centrifugal pumps; scales; motors and generators; complete coaling, sand and cinder handling and storage facilities.

FAIRBANKS-MORSE

Automatic Locomotive Coalers

5550—RA21.82

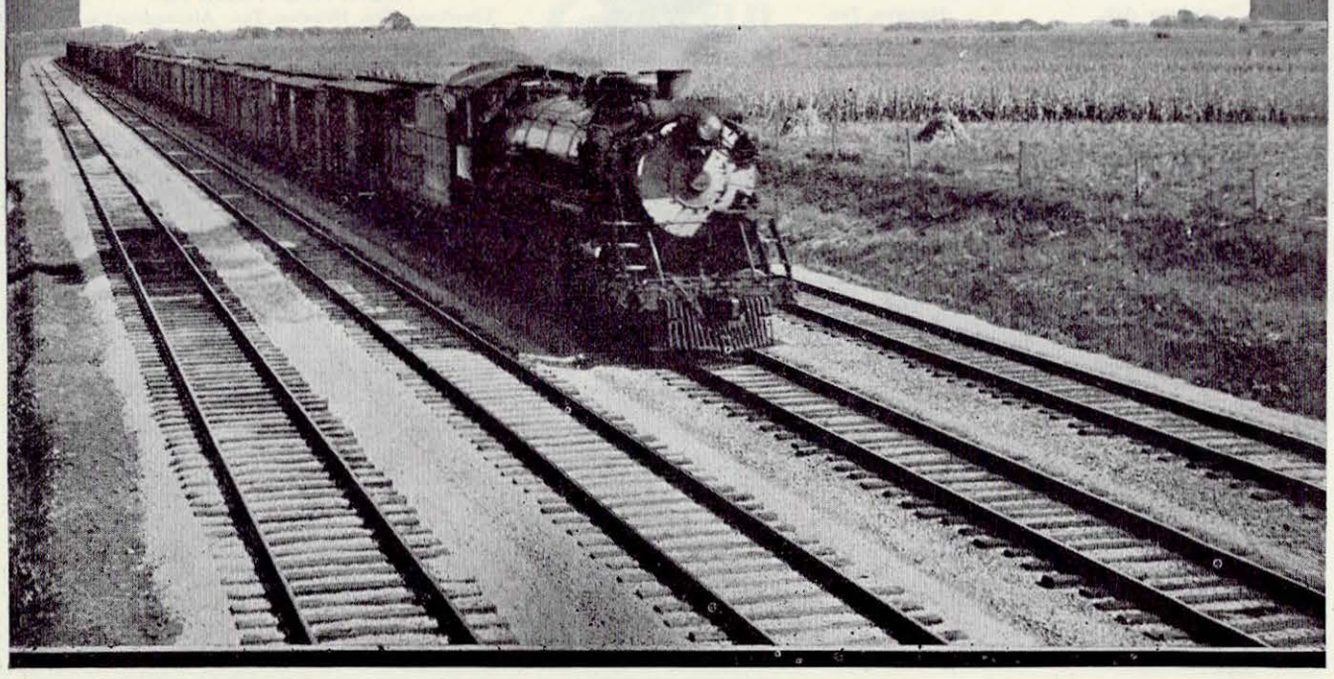
HEADFREE RAIL JOINTS



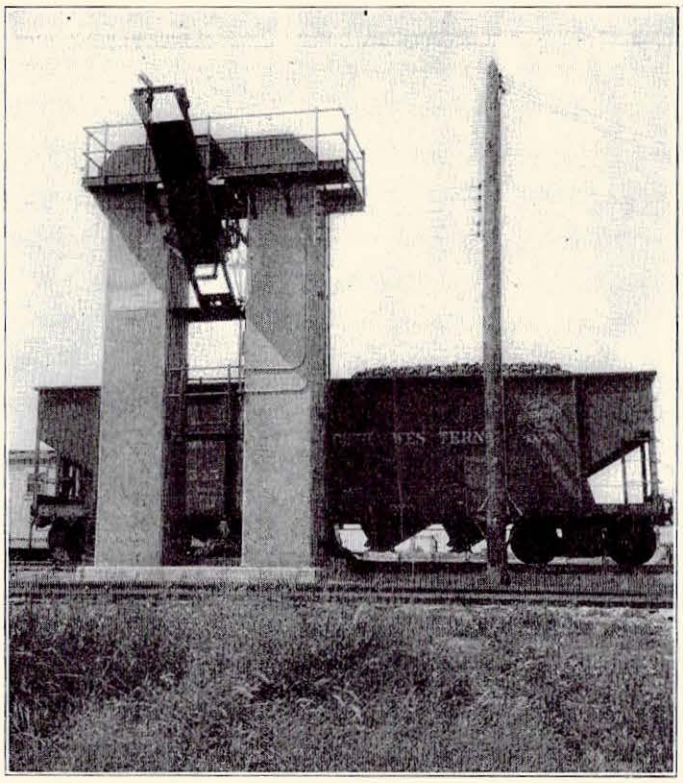
Make Good Track *Better*

The Rail Joint Company

165 Broadway, New York, N. Y.



This F-M conveyor type coaler handles 90 tons to the hour. Powered with a 10 hp. motor. Hopper capacity up to 50 tons.



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On most roads there are points where hand shoveling, locomotive cranes, bucket platforms and other obsolete methods of coaling locomotives are used. Coal handling costs at such points can be reduced —often to as little as 3 cents a ton—by installing Fairbanks-Morse Automatic Coalers.

The F-M conveyor type coaler operates on the same principle as the largest coaling stations. An all-steel conveyor chain assures many years of service and a high factor of safety. Coal is delivered in a continuous stream, thus eliminating spillage and overloading.

Both conveyor and skip-hoist types are built for continuous operation and can be started or stopped from the locomotive tender or the ground. Coal can be taken on without having an attendant at the coaler as a switch is located on the apron, convenient for the train crew.

Facts about the cost-cutting possibilities of F-M Automatic Coalers are of practical interest at this time when every saving in operating expense counts more than ever before.

We will send complete information upon request without obligation to you.

F-M Full-Automatic Skip-Hoist Coaler. This type handles 50 tons to the hour, Powered with a 15 hp. motor. Hopper capacity up to 50 tons.

FAIRBANKS, MORSE & CO.

CHICAGO

Manufacturers of railway motor cars; hand cars; push cars; velocipedes; stand pipes for water and oil; tank fixtures; stationary and marine oil engines; steam, power and centrifugal pumps; scales; motors and generators; complete coaling, sand and cinder handling and storage facilities.

FAIRBANKS-MORSE

Automatic Locomotive Coalers

5550—RA21.82

For nineteen years, The Oxweld Railroad Service Company has contributed to the efficiency of American railroads by providing them with the best methods and materials for oxy-acetylene welding and cutting. Year after year, the majority of Class I railroads are finding Oxweld Railroad Service of increasing value.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation

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NEW YORK, Carbide and Carbon Building
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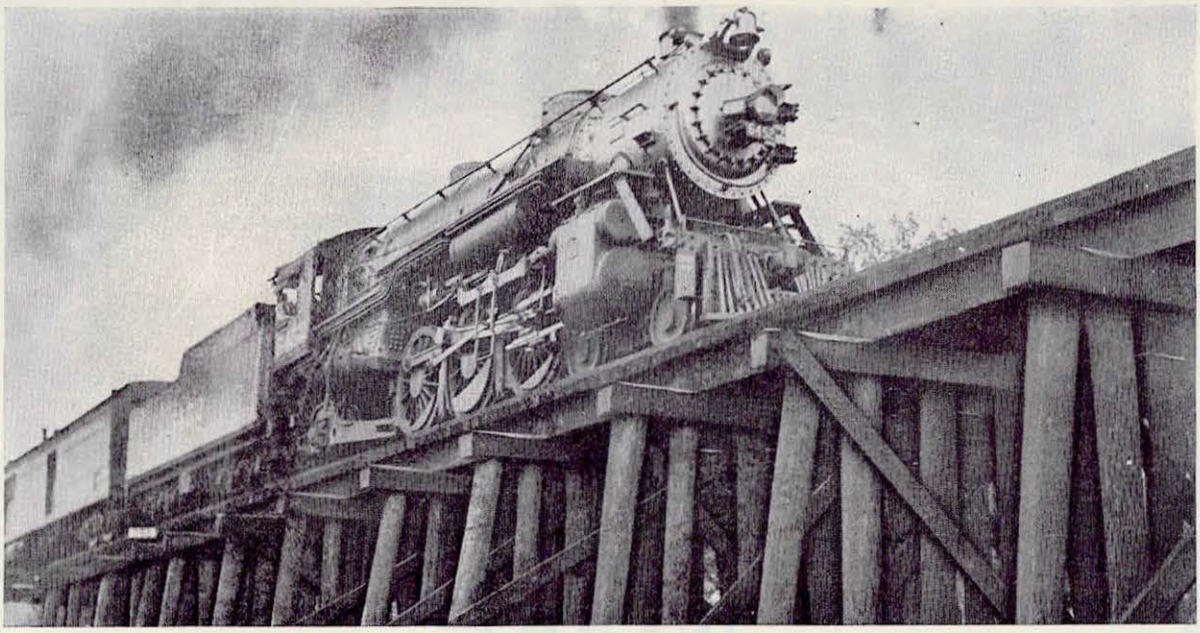

• PROTECT EQUIPMENT INVESTMENTS •

Proper roadbed maintenance is essential to the efficient, economical operation of trains. The consistent use of National Lumber & Creosoting Company Pressure Treated Cross and Switch Ties, Piling and Timbers is one sure means of simplifying the maintenance problem and reducing replacement costs . . . with added safety. For information and prices address:

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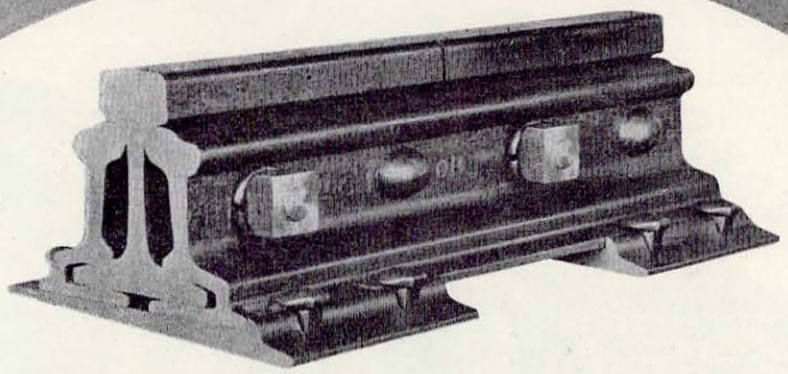
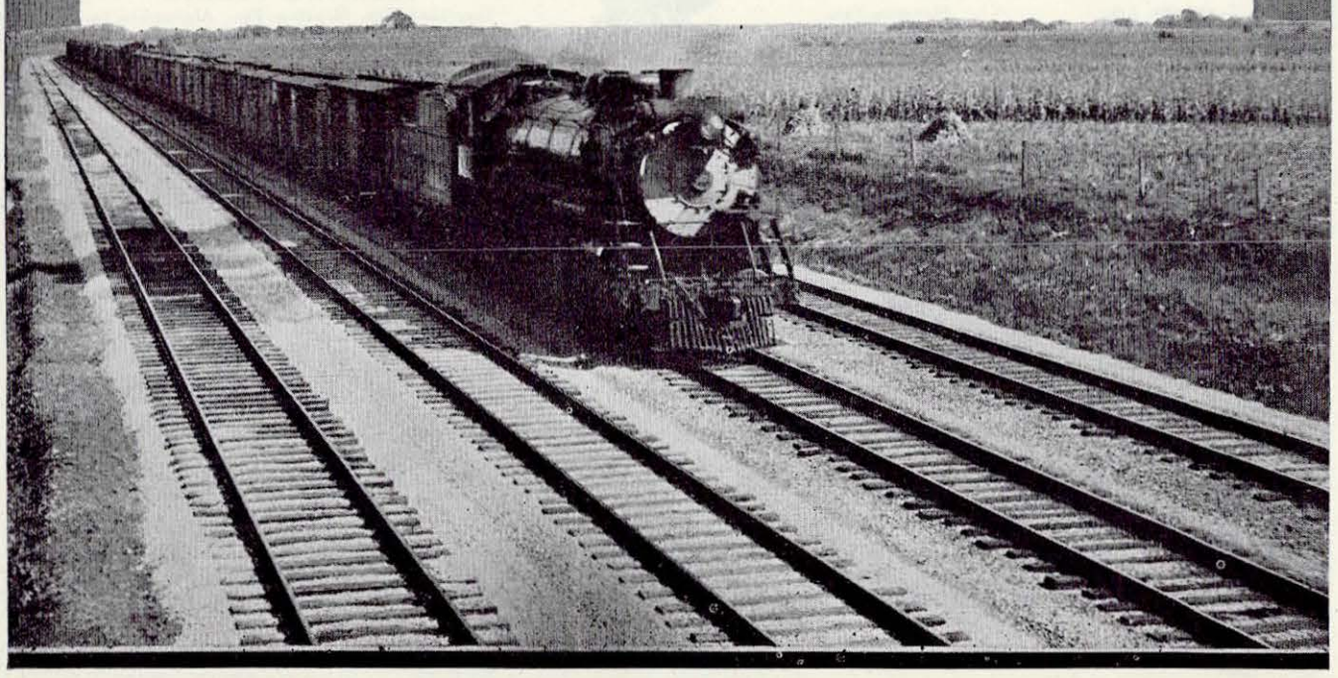


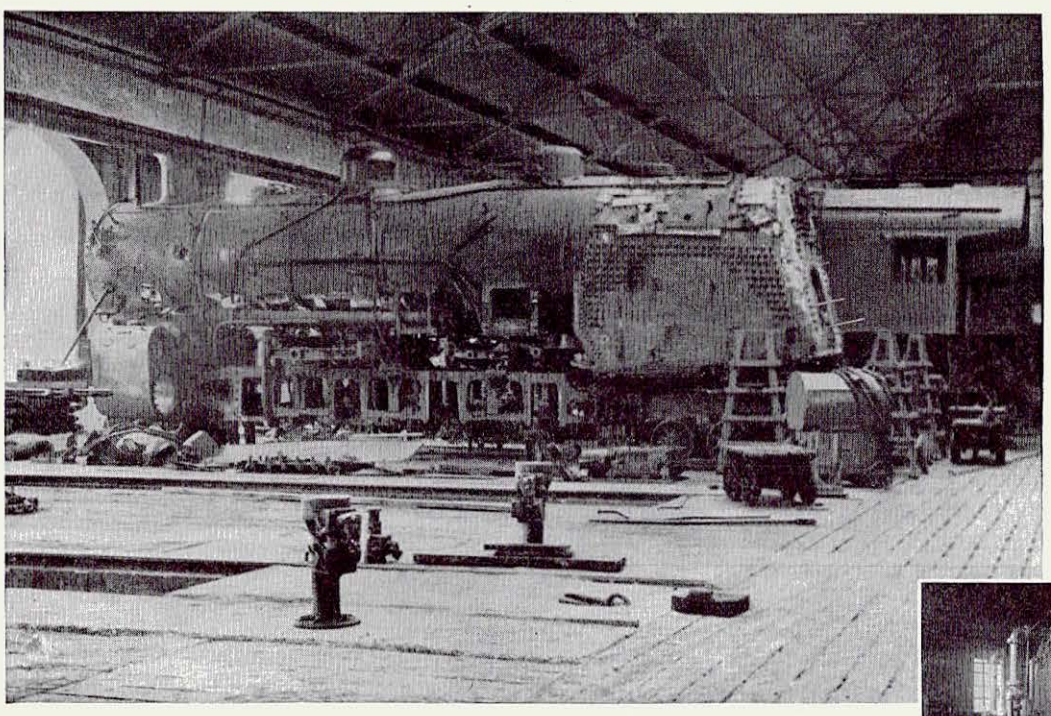
Make Good Track *Better*

The Rail Joint Company

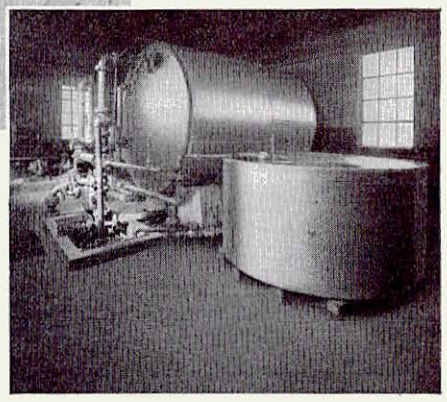
165 Broadway, New York, N. Y.



$391,500 SAVED *annually by* Soft Water



HAVE you ever considered how much it would save your road if boiler scale, the most frequent cause of locomotive shopping, was eliminated? Read what one system's experience has been.



Permutit Equipment installed near Chicago by a Class I railway (not the one cited here)

Locomotive maintenance and repair bills on Class I railway lowered by Permutit Water Softening Equipment

ON AN investment of $139,883 in Zeolite Water Treating Equipment, a large railway made an *actual* annual savings of $391,500. This figure includes labor and materials connected with locomotive maintenance and repair. It is *exclusive of savings in fuel* resulting from locomotive boiler flues that are kept clean with completely softened feed water.

Zeolite Equipment completely removes scale-forming materials from locomotive feed water. Applied to the water stations on your road, Zeolite Equipment will pay you large annual cash dividends.

Devote a little time to investigating this subject—you will be well repaid. As a starter, write us for "Soft Water for Railroads," which describes actual operating results of Permutit Zeolite Water Softeners in railway service. There is no charge or obligation.

Permutit

THE PERMUTIT COMPANY
440 Fourth Avenue, New York, N. Y.

Manufacturers of Industrial and Household Zeolite Water Softeners, Hot and Cold Lime Soda, Lime-Barium Water Softeners—Sand Filters—Iron, Oil and Manganese Removing Filters—Continuous Boiler Blowoff Equipment—Ranarex CO_2 Indicators and Recorders—Other Power Plant and Water Treating Specialties.

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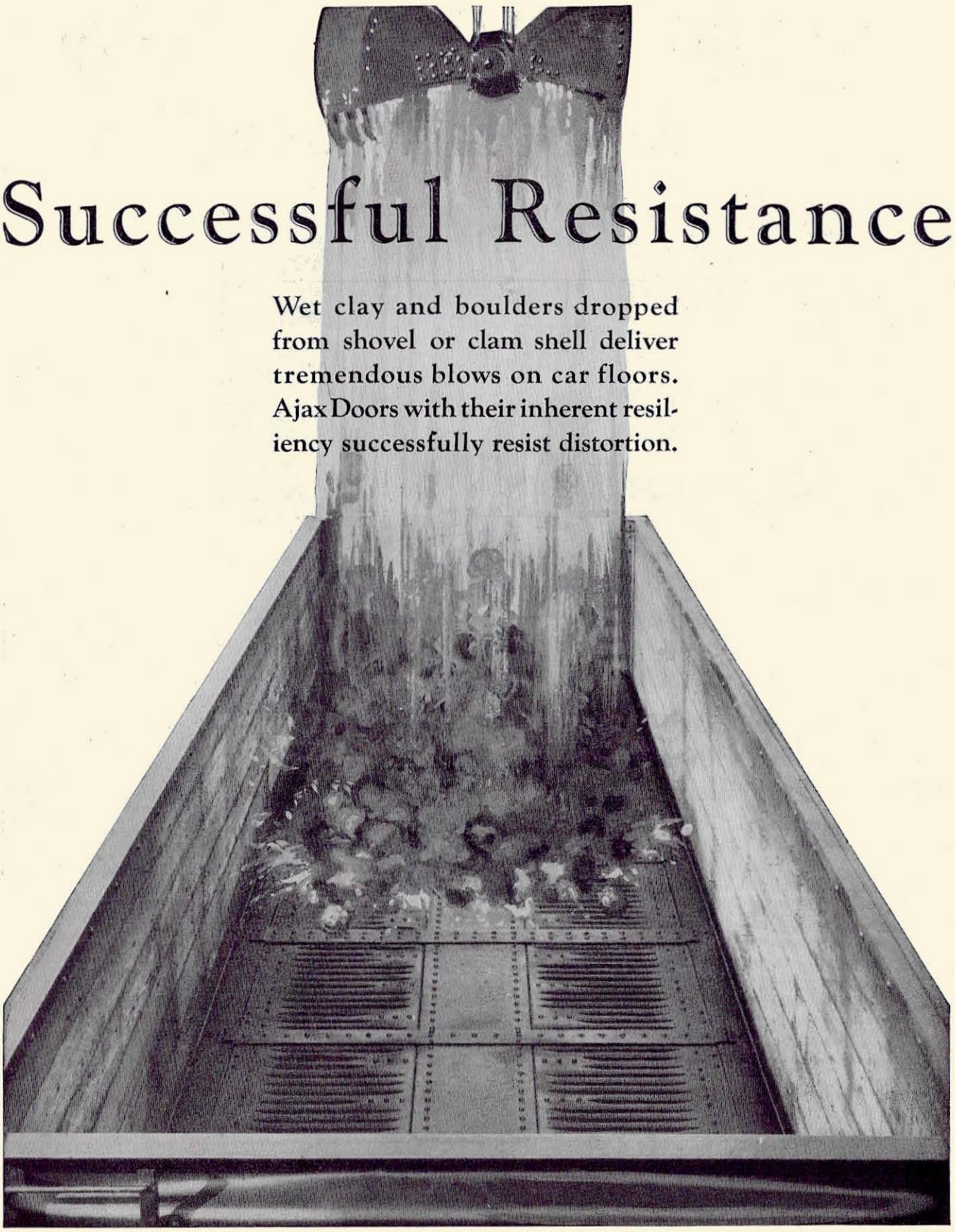
Successful Resistance

Wet clay and boulders dropped from shovel or clam shell deliver tremendous blows on car floors. Ajax Doors with their inherent resiliency successfully resist distortion.



UNION METAL PRODUCTS COMPANY

NEW YORK · CHICAGO · ST. LOUIS · WASHINGTON
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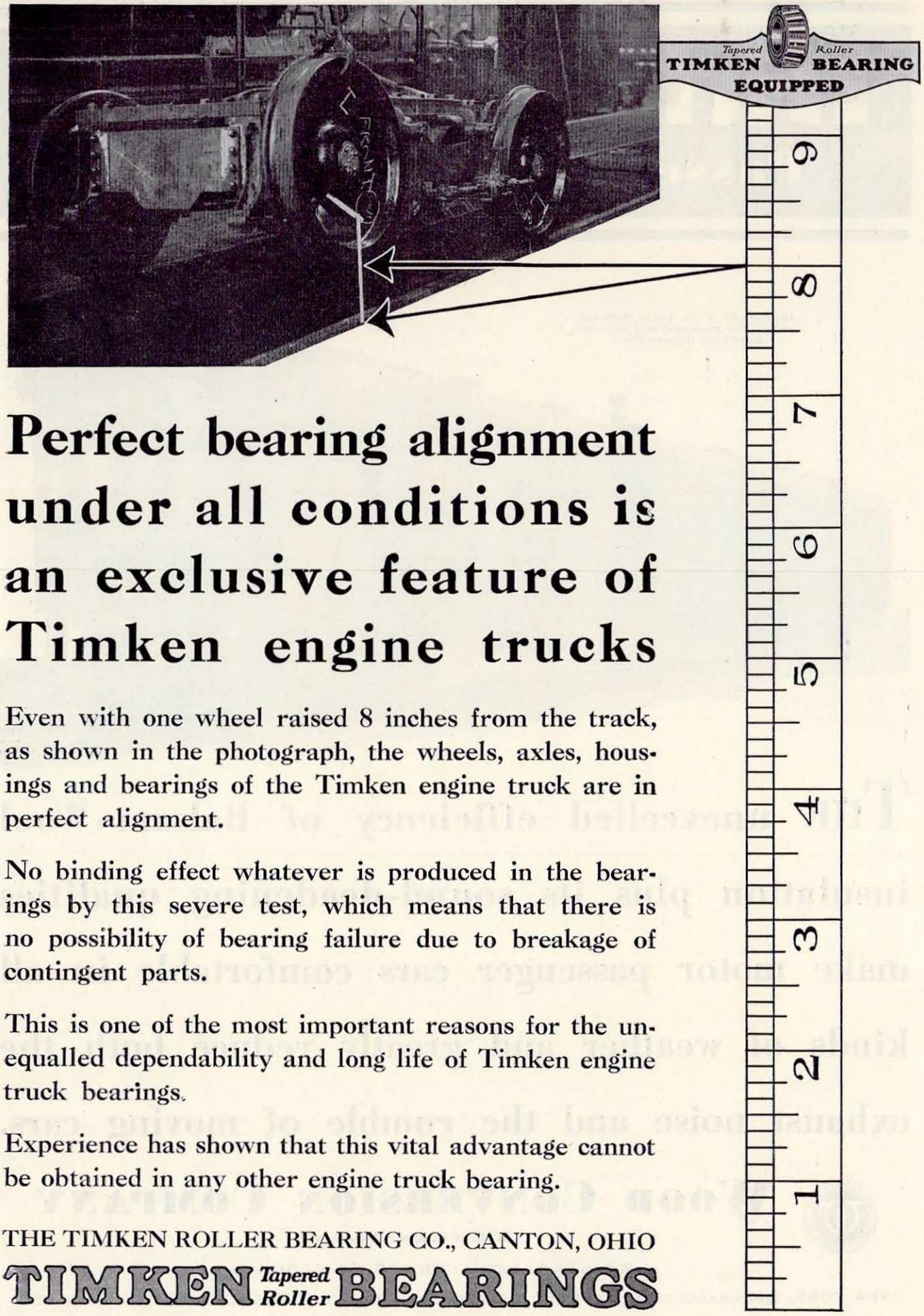

Perfect bearing alignment under all conditions is an exclusive feature of Timken engine trucks

Even with one wheel raised 8 inches from the track, as shown in the photograph, the wheels, axles, housings and bearings of the Timken engine truck are in perfect alignment.

No binding effect whatever is produced in the bearings by this severe test, which means that there is no possibility of bearing failure due to breakage of contingent parts.

This is one of the most important reasons for the unequalled dependability and long life of Timken engine truck bearings.

Experience has shown that this vital advantage cannot be obtained in any other engine truck bearing.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

Balsam-Wool
Passenger Car Insulation

Minneapolis & St. Louis Railroad gas-electric passenger and mail car lined with Balsam-Wool

THE unexcelled efficiency of Balsam-Wool insulation plus its sound-deadening qualities make motor passenger cars comfortable in all kinds of weather and greatly reduce both the exhaust noise and the rumble of moving cars.

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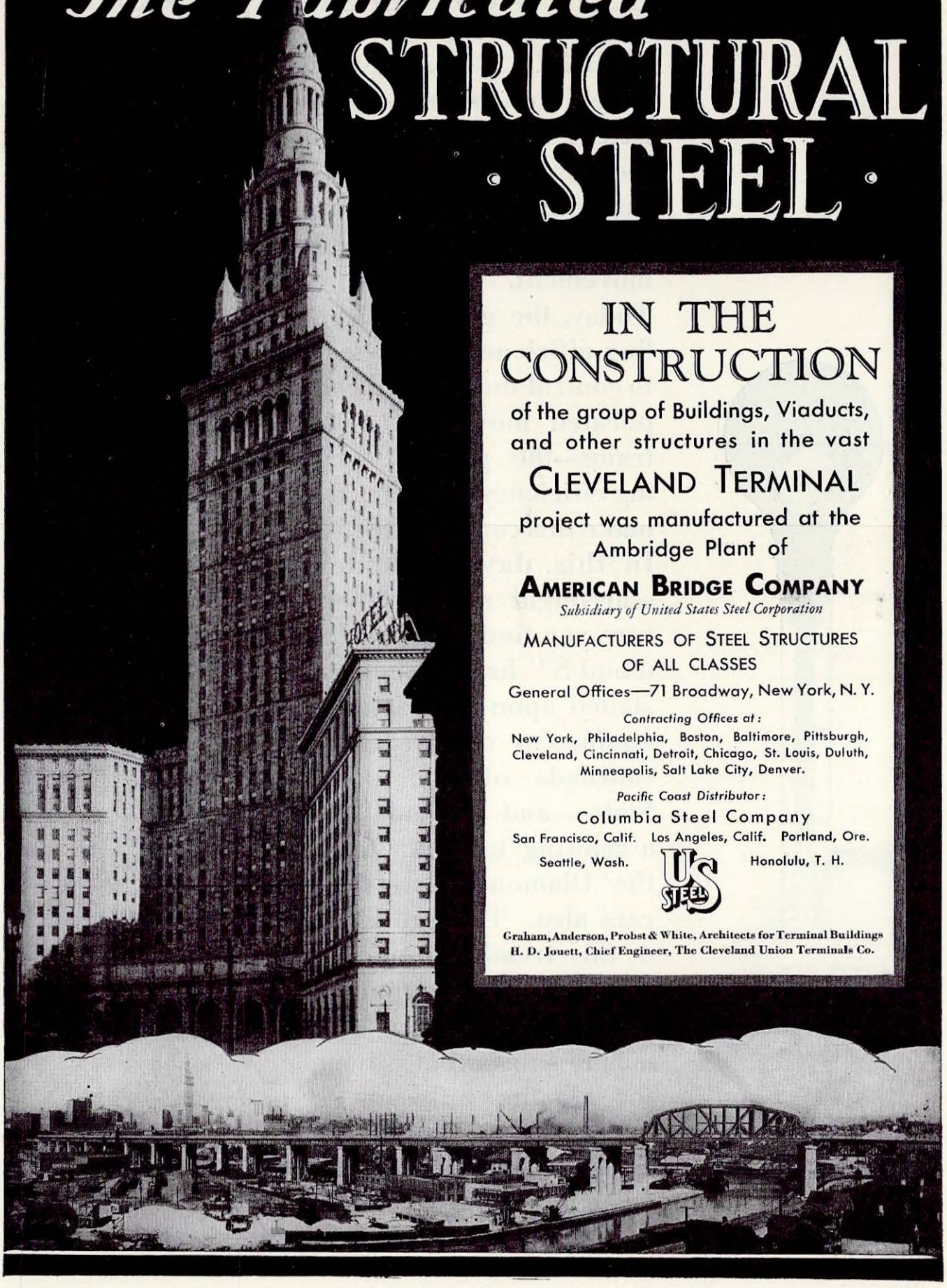
The Fabricated STRUCTURAL STEEL



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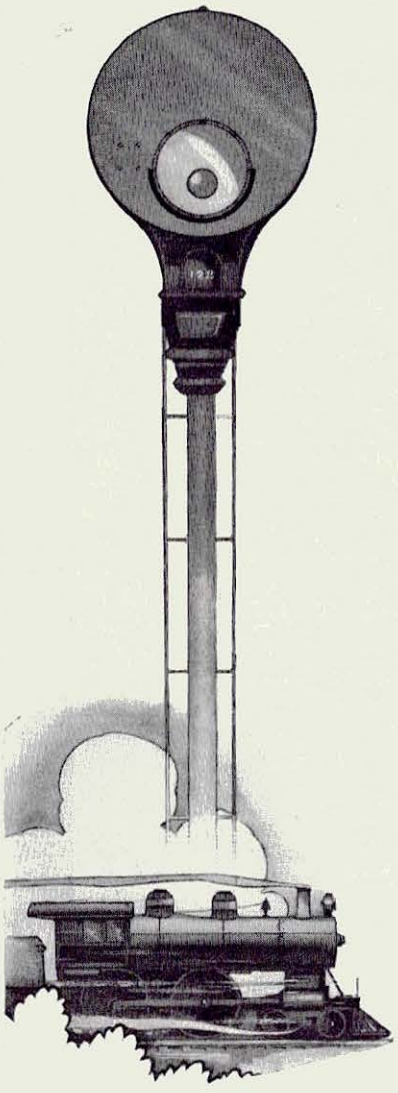
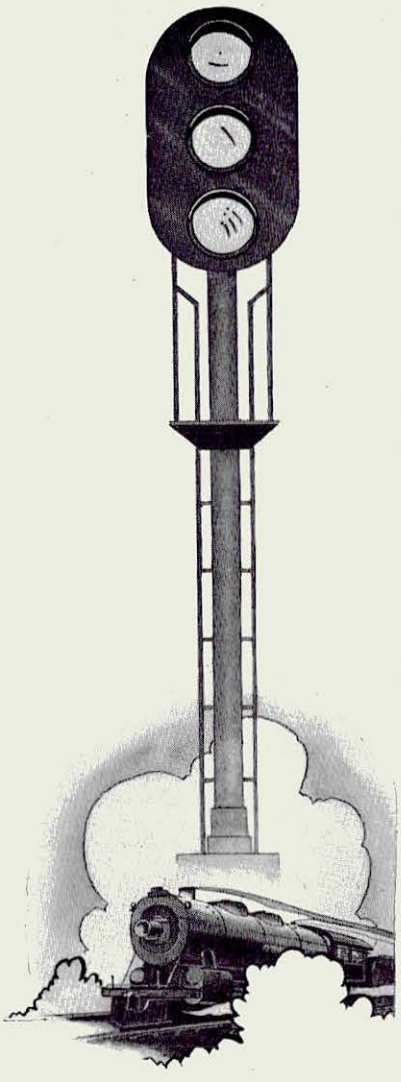
SHOES *and* BANJOS

THIRTY years ago the old banjo signal was sufficient to control train movement and ordinary cast iron brake shoe could be counted on to *halt* train movement.

Today, the greatest signalling efficiency is necessary to control the fast and complicated movement of all trains—the greatest braking efficiency is required to make this control effective. In this day of modern searchlight signals, therefore, you find modern "Diamond-S" brake shoes installed upon the passenger equipment of the leading railroads of the United States and Canada and a growing tendency to use the "Diamond-S" on freight cars also. The fulfillment of this trend—adoption of the "Diamond-S" upon *all* freight equipment—will mean substantial savings for all the railroads.





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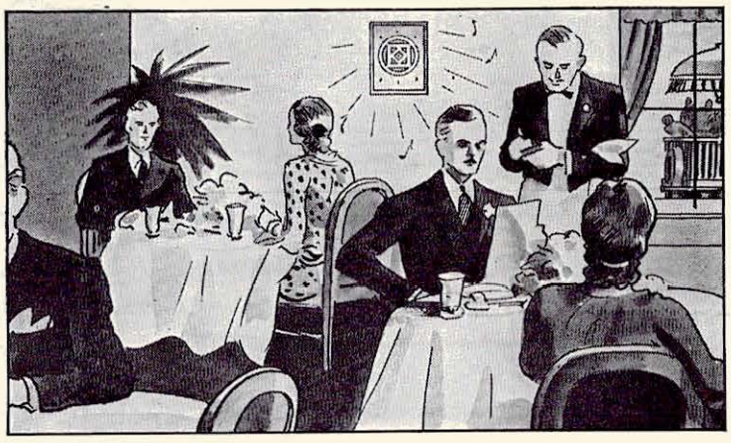

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Great orchestras play in your station restaurant for a few cents an hour with the Western Electric Music Reproduction System. Here you have equipment which plays standard records in rich tones that do justice to the playing of the recording orchestra. It also amplifies to any desired degree and delivers the music at any number of points. Mail the coupon for description of many railroad uses for this apparatus which is made by the makers of telephones for the Bell System.

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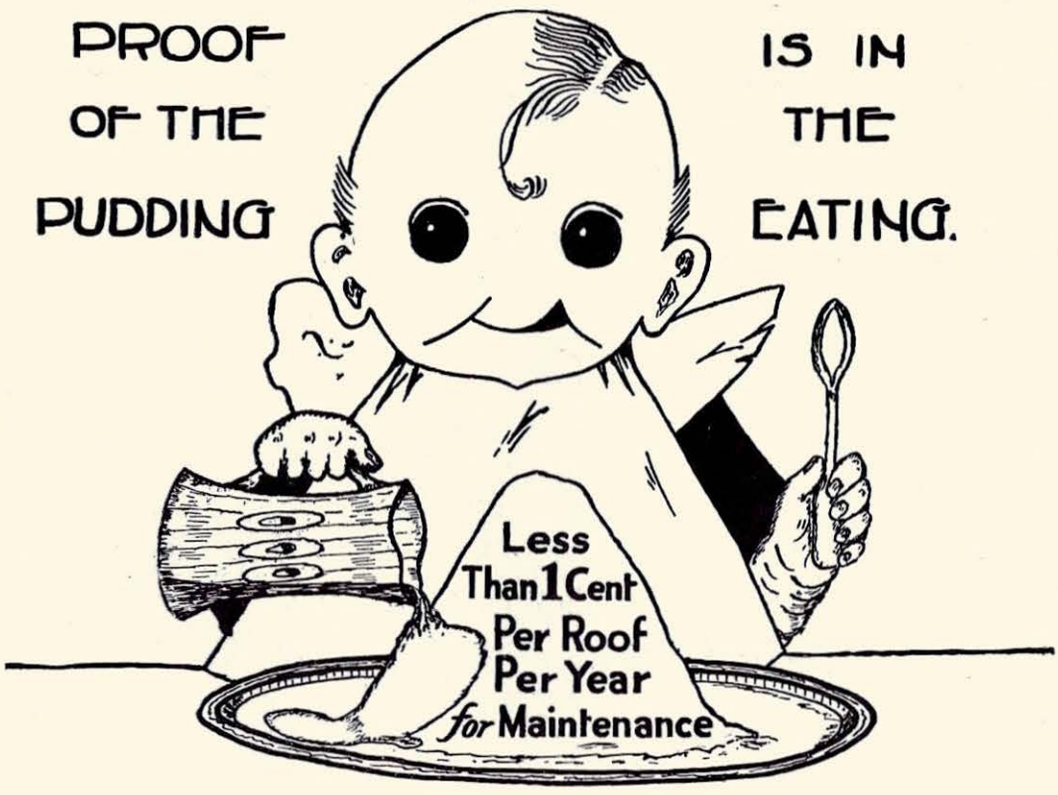
LONG LIFE LOW MAINTENANCE



WHEN it comes to proving the long life and low maintenance of the Dry Lading Roofs, the best evidence you can get is years of actual records.

Study this one. The cost of roof maintenance, from 1913 to 1930 inclusive on 30,000 Canadian National cars equipped with Dry Lading Roofs, amounted to $4519.49. The average maintenance expense, during this 18 year period, amounted to less than one cent per roof per year.

This performance record, extending over 18 years and covering 30,000 cars, demonstrates without question the great economic value of the Universal Dry Lading Roof.

And the reward is pretty sweet.

Hutchins Car Roofing Company

RAILWAY AGE

Shall Private Industry or Government Increase Employment?

The continuance of the depression is causing many suggestions to be made for reducing unemployment. Some of the proposals made raise an economic question of the greatest importance. This is, as to whether increased employment should be provided by private industry or by government in ways and on a scale that would largely reduce the ability of private industry to provide it, not only in the immediate future, but for a long period. Some of the proposals for having employment so provided by government as would reduce the employing power of private industry come from surprising sources. The following quotations are taken from an editorial recently published in a leading engineering paper: "Shall next winter's unemployment emergency be relieved by work or by charity? * * * Public works can employ the idle and make available to them, not by gift but by the right of labor, the stores of food, clothing and shelter of which the country has abundance. Private business has proved powerless to maintain the workers at their jobs. * * * The country's annual budget of public-works construction approaches 3½ billion dollars. An addition of little more than twice this amount will give work to five million men at an expenditure of $1,500 per man for labor and materials. * * * Road work alone could take care of the entire unemployment emergency, were no other source of work at hand. * * * But such intensive use of a single resource is not necessary. * * * Cities can make available a vast total of urgent work—street widening and paving, modernization of public buildings, sewer and water improvement and the betterment of medieval conditions in dozens of directions. * * * The difficulties are great but they can be overcome. * * * Heavy tax burdens and local bond obligations throttle the public work of local communities. * * * But financing is easily accomplished through the superior ability of the federal government to market bonds."

Taxes and Unemployment

It will hardly be questioned by any person who really believes in private property and private management rather than in socialism that an increase in employment due to a general revival of private business would be preferable to an increase in employment by government, direct or indirect. The advocacy of very largely increased employment by government, direct and indirect, by such a publication as that from which we have quoted probably is due to two things. One of these is that increased government employment of public works would increase business in the particular fields that this publication happens to serve. The other is that it despairs of a revival of general business in time to provide needed employment, and has not considered the effects that adoption of some policies it advocates necessarily would have in both the near and remote future upon employment in most private industries.

There is so much unemployment because employment has been reduced by private business. Employment has been so much reduced by private business because the total earnings of private business have declined so much that it has been necessary drastically to reduce every expense that can be reduced. On the railroads, for example, the number of employees is 332,000 less than in 1929, and even 304,000 less than in 1921, which, like 1931, was a year of depression. Employment on the railroads has been so much reduced because of the decline in earnings, and this has been principally due to a decline of traffic. Earnings and employment have been reduced in many other industries because of declines in both the volume of business and in prices.

There is one item in the expenses of most business concerns and industries, however, which, while smaller than a year or even two years ago, is much larger than it was some years before, and is larger in proportion to earnings during the depression than it ever was before. The total taxes being borne by the industry, commerce and people of the United States are now approximately three billion dollars annually greater than in 1923. If those who are paying this increase in taxes did not have to pay it they could, with that three billion dollars, employ 2,000,000 more men at

an average wage of $1,500 a year, or 3,000,000 more at an average wage of $1,000 a year than they can employ now. These figures give some idea of the extent to which private industry already has been deprived of the ability to give employment by the huge increase in taxes that has occurred within the last decade.

What is happening to private industry as a result of the retrenchments that the decline of earnings has made necessary? The railways will again serve to afford an illustration. In the first seven months of 1929 they spent $1,200,000,000 in the maintenance of their properties, and in the first seven months of 1931 only $850,000,000, a reduction of $350,000,000, or almost 30 per cent. At this rate the reduction of their maintenance expenditures in the entire year 1931 will be about $600,000,000. Their capital expenditures for improvements, which are made partly from earnings, have been reduced relatively more. What this means is that, in general, the physical properties of the railways are deteriorating, and that their ability to render good and economical service is correspondingly declining. Much the same thing is occurring in many other industries.

Destroying Employment in Private Industry

Now, as already shown, it is proposed to remedy unemployment by increasing expenditures on public works by "an addition of little more than twice this (the normal) amount", or from approximately $3,500,000,000 annually to approximately $10,500,000,000 annually. Annual interest upon this "addition" of $7,500,000,000 would be at least $300,000,000, and if the "addition" were kept in effect for two years, and, as a result, $15,000,000,000 were invested, annual interest on it at four per cent would be $600,000,000. If the bonds issued to carry out an "additional" $15,000,000,000 program of public works were liquidated in twenty years, the result of this increased expenditure upon public works would be an increase of approximately $1,200,000,000 annually in the taxes that would have to be paid by the American people for twenty years. The entire investment would be made in public property upon which no taxes would be levied. Therefore, all the taxes would have to be collected from property, business concerns and individuals that are taxable; and the effect of the increase in taxation necessary to liquidate the bonds issued and pay interest upon them would be to deprive private industry for twenty years of the ability to employ an average of 800,000 persons at an average annual wage of $1,500, or 1,200,000 persons at $1,000 annually, in addition to the 2,000,000 to 3,000,000 persons which the increase of taxes within the last decade is now depriving industry of the ability to employ. Furthermore, the public would have to pay in taxes for the maintenance of the new public works, and this would further impair the ability of private industry to give employment. Government expenditures are not made, as so many apparently believe, from manna that drops from Heaven. They can be made only from taxes collected from industry and the people, and every dollar of taxes collected correspondingly reduces the employing ability of those from whom it is taken.

It may be said that the highways, waterways, buildings and other public works upon which the proposed expenditures of the taxpayers' money would be made are needed. But are they all actually needed now? And are not equivalent expenditures for improvements and maintenance in private industry much more needed? As the same money cannot possibly be spent at the same time in both private industry and on public works, and as its expenditure in private industry unquestionably is much more needed than its expenditure on public works, why advocate a huge increase in taxation and in expenditures upon public works to increase employment? Why not advocate a huge increase in taxes to be distributed as a subsidy among all the private industries of the country to enable them to spend more for improvements and maintenance and thereby increase employment? The natural answer is, that if the money were distributed as subsidies to all private industries it would, in large measure, be handed back to the very industries from which it was taken, and that it would not help them to increase employment merely to take their money and then hand it back to them. But if it would not help them to hand their money back to them, how would it help them to have the government hand it over merely to those who construct highways, waterways and public buildings?

Railway Rates and Unemployment

It may be said that the railways are seeking an advance in rates which other industries and the people would have to pay. But the railroads are a private industry, and are seeking an increase in their revenues to avoid further reduction of expenditures for maintenance and to protect themselves from insolvency. Is not the public's need for an advance of $500,000,000 a year in freight rates to enable the railways to maintain their properties and employment and avoid bankruptcy greater at the present time than its need for an equal increase in taxes to be spent upon new highways? And yet the proposed advance in rates to save the railways from physical deterioration and insolvency is actually being opposed by some classes of persons who at the same time favor an increase in taxation to build new public works for which there is no pressing need!

For some years we have had a "new economics," the main principle of which has been that lavish expenditures by private individuals and governments are the royal road to national prosperity and wealth. Owing to the prevailing depression, which probably is mainly due to past widespread acceptance of the "new economics," lavish expenditures have had to be stopped in private life, but we still have the "new economics" with us and teaching us, that, although taxes have been increased three billion dollars annually in this country within the last ten years, the main thing

needed to increase employment and establish permanent prosperity is to increase by billions more the amount taken in taxes from the people and private industry, and turned over to government to spend upon public works, whether needed or not.

The whole theory is viciously unsound and economically destructive. Private business, and not government, should provide increased employment. Private business, and not government, will pull us out of the depression and maintain prosperity in future, if these results are ever accomplished. Increased government expenditures and taxes will only delay or prevent a return of prosperity. We believe it was Adam Smith who said that government should allow the people's money to fructify in the pockets of the people. All human experience shows that capital is more likely to be judiciously and successfully invested by private individuals than by government, that investments by government should be made only in those things that government alone can provide and that are plainly needed, and that no efforts should be spared to prevent government expenditures from being made in excessive amounts. The old economics are still true, and the way to secure and maintain prosperity still is to leave as much of the money of the people as possible to fructify in their own pockets.

Facing the Facts in Grade Separation

Those who advocate the wholesale separation of grade crossings of highways and railways counter any opposition on the ground of cost by declaring that human lives cannot be compared with dollars. This view necessarily disregards any consideration of the ability to pay and the relative efficacy of various safety measures in terms of the money expended. It overlooks such questions as have been raised, for example, regarding the relative benefits of automatic train control and highway crossing protection or elimination. In other words, counting the cost in considering a project for reducing hazard is entirely legitimate because to do otherwise is to ignore the need for prudent outlay and the possibility of expending the same sum in ways that will effect relatively greater protection against loss of life.

This is the position taken by the Public Utilities Commission of Ohio, on an appeal by the Baltimore & Ohio from an order of the Director of Highways of Ohio for a grade separation project entailing an estimated expenditure of about $222,000 to be borne by the state and by the Baltimore & Ohio and the Pennsylvania as joint owners of the line involved.

The decision points out that the crossing is not a particularly dangerous one in so far as danger of collision with trains is concerned, and that separation would not result in the elimination of serious hazards to highway traffic that would still prevail by reason of the sharp curves in the highway. In this connection it points to the effectiveness of grade crossing protection.

"The commission," the decision states, "has ordered throughout the state, the installation of many hundred flashing light signals which warn of approaching trains and has been gratified with a decided decrease in fatal accidents throughout the state, at grade crossings, resulting, in the opinion of the commission, from such protective devices."

The matter of the "ability to pay" is also faced squarely.

"The commission well knows that the railroads are hard pressed by loss of business and competition which they have not heretofore had to meet. It is also within the knowledge of this commission that this road, or in fact both railroads involved are proceeding in other locations in Ohio to the separation of grade at particularly dangerous crossings.

"Considering this appeal, therefore, from the standpoint of the relative dangerousness of the crossing and the $222,000 necessary for the separation of the grade and the economies which should be effected in the spending of the railroad's and likewise the public's money, because of an ever-increasing tax burden, the commission is of the opinion that the separation of grade at the crossing in question is not reasonably necessary and expedient and that the order of the Director of Highways should be reversed."

Inform Employees About Motor Vehicle Laws

The Missouri Pacific has recently taken an action which might well be copied by other railways. It has made available to all its officers and employees a summary of legislation recently enacted to control highway traffic in the states served by the Missouri Pacific lines. The object of this summary is to present, in readable and understandable language, the gist of this legislation so that the officers and employees may familiarize themselves with the progress which has already been made toward adequate regulation of highway traffic.

Proper enforcement of laws regulating the operation of motor vehicles is quite as important to the railways, the public, and others whose interests demand adequate regulation of commercial motor vehicles, as the passage of new laws toward this end. Railway employees are in a position particularly favorable for the observation of infractions of motor vehicle laws, and they owe it to themselves as well as the railways which employ them to report these infractions. Consequently, it is highly desirable that railway employees should be fully familiar with the regulatory laws in effect in their respective states.

Operating Economy Series

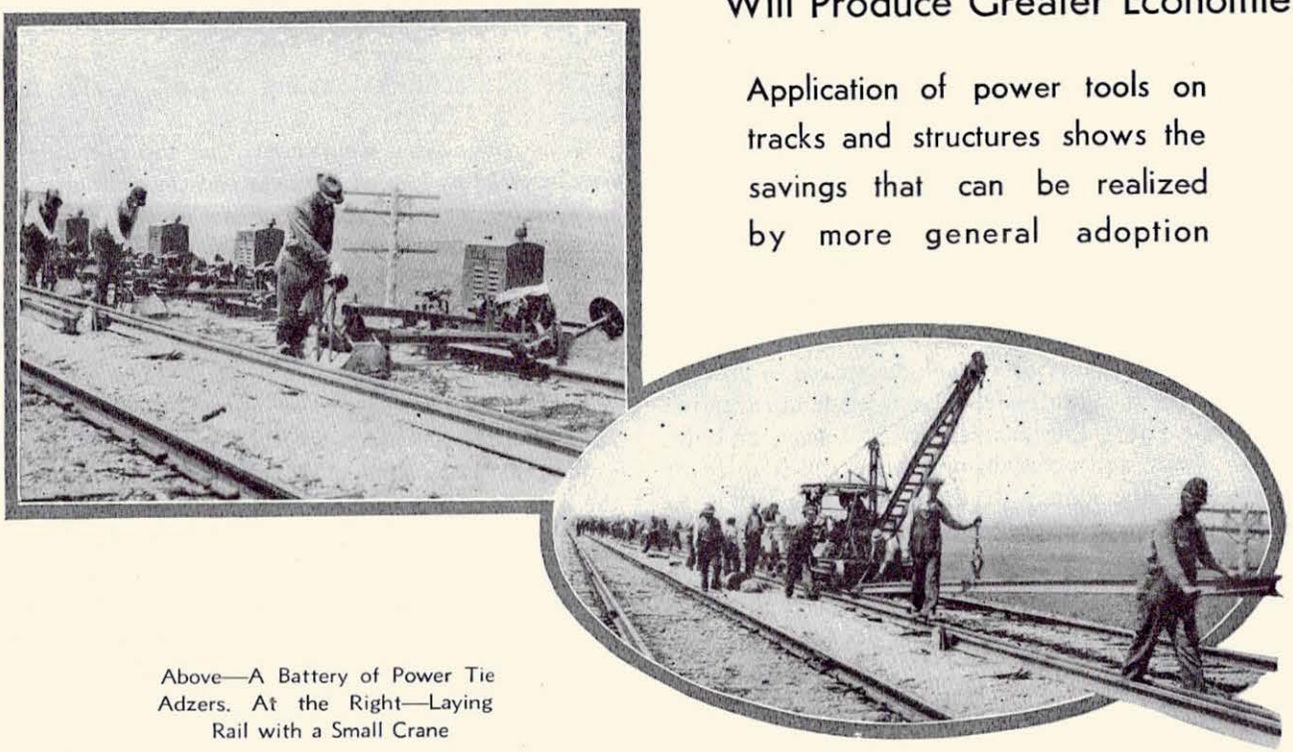
Article No. 11

Greater Use of

Machines in Maintenance Work

Will Produce Greater Economies

Application of power tools on tracks and structures shows the savings that can be realized by more general adoption



Above—A Battery of Power Tie Adzers. At the Right—Laying Rail with a Small Crane

THE time is ripe for an "industrial revolution" in maintenance of way. After more than 15 years of intensive development of labor-saving machines, appliances for the conduct of the primary operations of maintaining railway tracks and structures have attained a degree of perfection that leaves no room for doubt as to the economy that can be realized by their widespread use.

Many machines are being employed extensively, but more important than this is the change in the attitude of maintenance of way officers toward the problems arising in the introduction of these machines. Constructive thinking is gradually shattering the idols of established precedent. The fact that practices or schemes of organization have stood the test of 100 years of railroading is no longer proof that they should be observed today. Thus, when plans were first set on foot to introduce labor-saving appliances, the primary condition imposed was that the use of the machines must entail no interference with prevailing plans for the conduct of the work. Today, the chief concern is to determine what changes in practice or organization will facilitate the introduction of power tools or promote their more extensive use. Practical application of these new ideas has proceeded far enough to point the way to a much wider use of many appliances with a resultant increase in the economies to be obtained.

The maintenance of tracks and bridges embraces many operations which in the absence of power tools call for a maximum application of human energy and a minimum expenditure of mental effort in proportion to the amount of work accomplished. What industry offers better examples of this than the tamping of ties, the lifting of rails or heavy timbers, the driving of spikes, the tightening of bolts, the digging of ditches, the sawing and boring of large timbers, the dressing or cleaning of ballast, or the cutting of weeds?

However, thanks to the developments of the last 15 years, mechanical means have been evolved whereby the amount of human energy required for the performance of these various tasks can be so greatly reduced as to permit of a marked increase in the output of work per man employed. The story of this development in the adaptation of machinery to track and bridge work is one of almost dramatic interest. In spite of such obstacles as the lack of a supply of cheap power, the widely scattered character of the work, the remoteness of toolroom or repair service, and, above all, the fact that the machines have had to be adapted to the established routine and organization rather than the reverse, the results already secured have been remarkable. In trackwork it has been demonstrated that the number of men required to perform such work as ballasting and rail laying can be greatly decreased as a result of the use of power tools. In bridge work it has been shown that a gang of eight men properly equipped can renew as much open-deck pile trestle as a gang of a dozen men with ordinary hand tools. But

the best evidence of the results is the scope of the use of power equipment on many railways today.

Yet in spite of this development few machines are being used to the extent that permits of anywhere near a full realization of their potentialities as agencies for reduced costs. Some railways have made only a beginning in their use. Others are applying them only where efficient use is assured with the least disturbance of established routine. This reluctance to adapt methods of working to the requirements of the most economical performance of machines is well illustrated by the opposition encountered by those who first proposed the release of a main track for the conduct of major renewal operations.

This attitude is rapidly changing. Rail laying and ballasting are being done more and more on the basis of the division or grand division rather than the subdivision. It has been shown by practical test that much work normally done by section gangs can be performed on a quantity basis. The machines are available; it remains but to buy them and institute such changes in practice and organization as will insure their effective utilization.

Track Surfacing

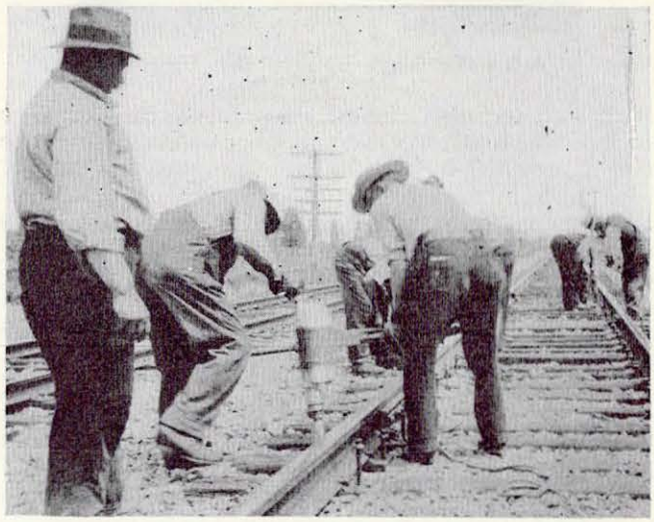
Power tie tamping tools for illustration, can produce a saving as shown by actual test, of $150 per mile of track or 25 per cent per annum on the investment in tamping equipment after adequate deductions for maintenance and depreciation. Track surfacing or tie tamping is of course one of the most fertile fields for the use of machinery because hand tamping is exceedingly arduous work. It is not strange, therefore, that efforts to provide mechanical means for doing this work were started earlier and were fruitful of practical results sooner than those applied to other operations. The figure given above and those which follow show what pneumatic and electric tampers are doing, but these economies can be developed on a still greater scale by the extension of their use on properties where they have as yet had little application and by changes in the track maintenance organization along lines that will afford opportunity for quantity production on a larger proportion of all the track surfacing that must be done.

With wide variations in the kinds of ballast, amount of the lift, type of equipment and character of organization, it is obvious that the savings are also subject to

Power Tampers Offer a Fertile Field for Economies

variation. However, the Committee on Economics of Railway Labor, in a report to the A. R. E. A., has presented data on tie tamping, out of face, that indicate savings ranging from $50 to $435 per mile. From these data, the committee estimates an average saving for power tamping of about four cents per foot of track in the cost of doing the work, compared with pick tamping. There is also the economy derived from better results, since there is general agreement that power tamping produces more uniform surface and a solidity of tie bed that permit of a greater interval between surfacing operations. One officer of track maintenance estimates that power tamping will last 50 per cent longer than hand tamping.

Another machine of more recent development that is being applied with increasing frequency on ballasting work is the power jack. This is a track car equipped with rail clamps and a gasoline engine geared to two worm-actuated spuds capable of lifting 25 tons. As an illustration of the possibilities of this device, a force of seven men with one of these machines on an eastern road raised 900 ft. of track for an average lift of eight inches in an hour, whereas it is estimated that 20 men



Electrically-Operated Screw-Spike Drivers

would have been required to perform the same work with hand-operated jacks. The average operation for a day to keep ahead of a tamping gang of 65 men was 5,100 ft. in 5½ hours.

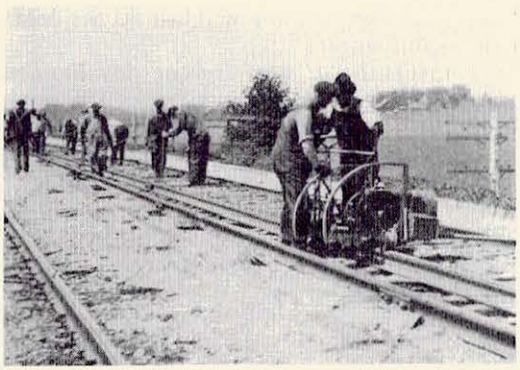
A variation of this machine is designed primarily for throwing or shifting track and is especially useful in widening embankments or making yard fills, since it can shift track at a small fraction of the cost of doing the work by hand. There is also a much heavier self-propelled machine designed for both lifting and shifting that can be used also for switching cars.

The total advantages to accrue from the use of mechanical equipment in surfacing track have by no means been fully realized. Surfacing that falls to the lot of the section gangs is still done almost entirely by hand although one large eastern line has found it profitable to furnish individual tamper outfits to each alternate section. The methods of handling general surfacing with power tools are still undergoing revision as new appliances are brought out and as better methods suggest themselves. On one road, for example, progressive improvement in methods resulted in a saving of 19 per cent in the cost of ballasting in the fourth year's use of power tools in comparison with the performance for the first year.

Rail Laying

Rail renewal is another maintenance operation that calls for a large expenditure of labor. Here also, mechanical equipment offers vast possibilities. With a full complement of power tools one division of the

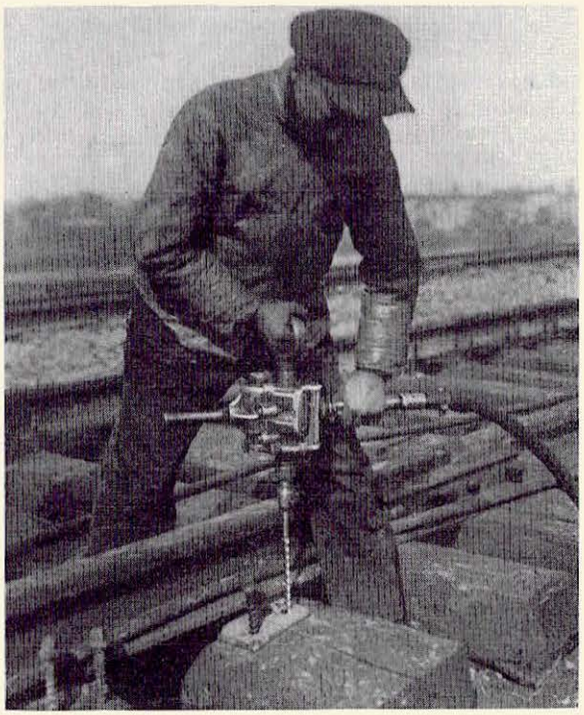
Pennsylvania, according to a paper presented before the Roadmaster's Association, was able to perform this task in 1930 at an average cost of $2.75 per ton of rail laid compared with a cost of $5 per ton for manual work covering the same items of expense. Rail laying,



A Gasoline-Engine Operated Bolt Tightener

from start to finish, embraces a sequence of operations each of which involves arduous labor unless some power tool is provided for it. Sufficient progress has already been made in the introduction of such tools to demonstrate their effectiveness and point to the economies to be obtained by their more extended use. As a matter of fact, power tools are now available for all of the operations involved in rail renewal in which hand labor is arduous or which require the employment of many men if done by hand.

The most important step in reducing the cost of laying rail is the substitution of power cranes for manual labor in the operation of placing the new rail in position and in loading out the old rail. Locomotive cranes normally employed in other railway service were



Boring Holes for Lag Screws with a Pneumatic Drill

first assigned to this work, followed later by light cranes designed especially for the moderate loads to be handled. More recent models embody the full revolving feature and more rapid action. Since rails can be set in place with the aid of three men and a crane operator, compared with the number of men required to handle rails of various weights with tongs, the economy of using cranes requires no explanation. As a matter of fact, the laying of 39-ft. rails weighing 130 lb. per yard or more by tong men, is a cumbersome process fraught with serious hazards. Rail laying with cranes on single-track lines imposes a problem in the clearing for trains that has not yet been fully solved, but it is of interest to note that during the present summer rail was laid on a single track with a caterpillar tractor equipped with an improvised boom and that this machine readily crawled over the rails to a position in the clear for passing trains.

Other appliances of demonstrated merit in laying rail are pneumatic and electric hand-held spike pullers and a truck-mounted mechanical spike-pulled, pneumatic and electric hand-held bolters and a trolley-mounted mechanical-type bolter, and a tie adzer. In addition, pneumatic and electric drills, power saws and the oxy-acetylene torch can be effectively applied to certain incidental details of the work.

Nearly all of the machines employed in laying rail are of the hand-held type, the saving in cost being founded on the increase in the output per man per hour when provided with the power tool. In some cases, the working capacity of the machine is greater than the physical capacity of one man to operate it, and greater output is obtained by alternating or "spelling" the men.

Not only do these machines do more work to an extent that justifies their purchase and use, but in most cases their work is of better quality. Spikes are driven truer with the power drivers and the hazard of injury to the rail from a misplaced blow is eliminated. The tie adzer automatically produces a true, level surface which only a highly skilled hand adzer can duplicate and which, in spite of all manner of rules and the best of supervision, cannot be obtained from any group of men assigned to this work in a rail-laying gang. Power tools will not do the impossible; a power spike-puller, for example, will not pull spikes with defective heads any better than it can be done with claw bars, but with proper organization these shortcomings do not militate against efficient conduct of the work.

In this connection, it is pertinent to direct attention to the extreme flexibility of the mechanization of rail relaying. Each operation is conducted as a separate entity, except for the fact that the organization plan must insure a uniform rate of progress for all functions, and for the further fact that two functions, spiking and bolting, for example, receive power from the same generator or compresser. Furthermore, the use of power tools does not militate against the use of hand tools for the same or other work. Workmen with hand tools may be employed to supplement a machine that is behind schedule, but what is more important, a railway may elect to apply any or all of these appliances to rail renewal work as local conditions may determine, reserving for hand methods the operations for which no power equipment is procured. A distinctive feature of the Pennsylvania's rail-laying record cited above is that the work done included the distribution of the new material and the loading out of the released material in the one day by the same gang that laid the rail. Here is an untouched field for economy in work-train service that is worthy of development.

By way of examples of the relative output of machines and hand tools; a pneumatic spike driver operated alternately by two men did as much work in 1 min. 30 sec. as four men with mauls did in 7 min. Fifteen men equipped with six electric drills and two electric wrenches drilled holes and applied screw spikes

at the rate of 503 per hour. A gang of six men with pneumatic wrenches bolted up twice as many joints as 36 men with hand wrenches. The introduction of two adzing machines in a rail-laying operation made it possible to reduce the force by 9 men, while maintaining the rate of progress necessary to keep ahead of the rail crane.

Bridge Work

At least 90 per cent of the work of building and maintaining wooden bridges is done without the aid of power tools that are adapted to such use. Thus, the status of bridge work with respect to the use of machinery is distinctly different from that of track work. Whereas nearly all items of track work are being carried out to some extent with the aid of machinery, in bridge construction and maintenance some work is done entirely with power tools while other work is still performed almost wholly by hand, thus affording almost unlimited opportunity for economies through the application of labor-saving appliances.

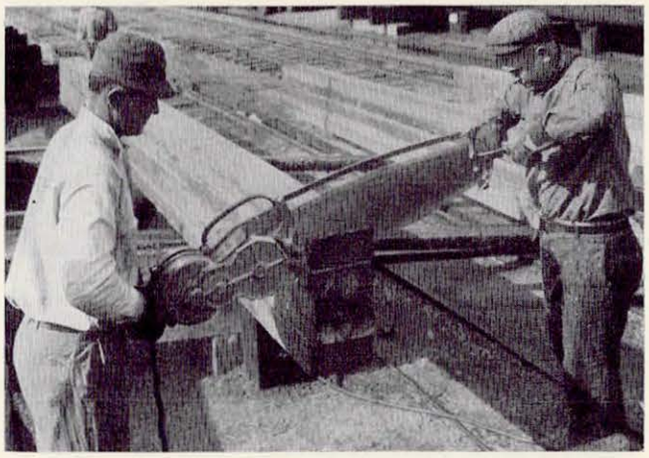
The pneumatic riveter has been used so long in steel bridge erection that to work without it is almost inconceivable. The same is true of the concrete mixer. With the availability of compressed air on a steel erection job, it is obvious that the pneumatic drill would be used extensively, while with accessibility to electric current on concrete jobs, it is not uncommon for power table saws to be used for cutting form lumber.

In sharp contrast with these practices is the status of wooden bridge work, which although it involves the handling of heavy members and the extensive use of cutting tools, is still a virgin field for the application of power tools. The work of building or renewing railroad pile or frame trestles of either treated or untreated material is one of the last strongholds of hand labor. Even the manual lifting and transporting of the heavy timbers has only slowly succumbed to the substitution of derricks and cranes, as will be shown in another article. It is only recently that any practical use has been made of power saws and drills, because their introduction had to wait the development of special equipment that is peculiarly adapted to this particular type of timber work. In a measure also, progress was delayed until power units of the most suitable type were to be had. The development period is now over, the machines are available, they have been subjected to protracted service tests under everyday working conditions, and the economies to be effected have been clearly shown. It remains for the railways to realize these economies by a general adoption of this equipment. What can these machines do?

In tests with the electric chain saw at a time when the men in the gang had had only limited experience in handling them, eight old oak piles were cut off in 16 min. or an average time of 2 min. each, ten treated cypress piles were cut off in 15 min. or 90 sec. each, and twelve 9-in. by 24-in. treated fir stringers were cut off in 20 min. or 100 sec. each The piles in a six-pile bent were cut off in line with a straight-edge guide in less than 8 min., whereas to cut off piles in a six-pile bent with a cross-cut saw and two men would have taken approximately one hour and ten minutes.

In tests with an electric wood-boring machine, a $1\frac{3}{16}$-in. diameter hole was drilled in a treated cypress pile 15 in. in diameter and a 4-in. sway brace in one minute, compared with 5 min. 40 sec. with a hand augur. In another case involving a 14-in. pile, the time was 55 sec. for the electric drill and 5 min. 5 sec. for the hand augur.

With pneumatic machines of the same type and a small self-propelled crane, two carpenters and two helpers completed four five-pile bents (after the piles had been driven) in 6 hr. 50 min. or at a labor cost of $15.50, whereas previous experience indicated a working time of 11 hr. 20 min. for the same men to do the work without mechanical assistance or at a labor cost of $25.72. By providing certain of its bridge gangs with power saws and drills and a suitable power generating unit, together with a small self-propelled crane, one railway has been able to effect net savings of from $1.25 to $1.50 per linear foot of trestle in the renewal of open-deck pile trestles.



Chain-Link Saws Save Money in Bridge Work

Spray Painting

The fact that the paint sprayer has been used for the last three years to apply an average of more than 2,000 gal. of paint annually on the Quebec bridge should be proof enough of the practicability of using this substitute for hand brushing on railway bridges. However, the paint sprayer presents an unusually good example of a device that has attained a high state of perfection and enjoyed extended application for some purposes but which has been used but little for others to which it appears to be equally adapted, notably railway bridges.

Spray Painting Has Been Done Extensively on the Quebec Bridge

Owing to the fact that the Quebec bridge has been

painted only to a minor extent with brush application, comparisons of spray and brush methods on that structure cannot be made, but ample data are available from other sources to demonstrate the economy of spray painting. The following comparative data were taken from a report of the Committee on Economics of Railway Labor of the A.R.E.A. for 1929.

Bridge A—		
Cleaning by hand	$325	
Spot painting	75	
Painting by hand	180	
		$580
Cleaning by hand	$325	
Spot painting	40	
Painting with sprayers	90	$455
Saving from use of sprayers		$125
Bridge B—		
Cleaning by hand	$150	
Painting one coat by hand	90	
		$240
Cleaning with pneumatic scrapers	$75	
Spot painting	10	
Painting with sprayers	40	
		$125
Saving due to power equipment		$115

Various comparative estimates of the labor cost of spray and brush painting have been given as follows:

Spray painting	$0.0025 per sq. ft.
Scaffolds, etc.	.0025
Total	.005
Comparable cost of brush painting	$0.01 per sq. ft.

In another case spray painting is credited with a reduction in cost from an average of $0.105 per sq. ft. to an average of $0.005 per sq. ft. Still another authority offers the following comparison:

Spray painting	$0.03 per sq. ft.,	$3.50 per ton
Brush painting	0.14 per sq. ft.,	4.00 per ton

Power Units

One condition which has retarded the utilization of power tools in railway maintenance work is the fact that central station power is available in only a limited number of locations—the power must be produced as electrical or pneumatic energy on the ground by means of portable units driven usually by gasoline engines, although in some cases, the gasoline engine provides the power direct. Such portable power plants are now available in sizes and mountings suitable for almost any ordinary requirements, and while the cost of the power produced, including the fixed charges on the investment, is necessarily high compared with public service rates for electrical energy, where available, the cost is low compared with the human energy it replaces.

In considering the cost of the power plant in connection with the proposed mechanization of any operation, it is well to bear in mind that each tool or group of tools does not have to have its own plant. Much railway maintenance work is seasonal in character so the tools employed in it are not in constant use. Therefore, the power plant bought for one operation may frequently supply power at another time of the year for some other work. Air compressors used for tamping may supply air for rail laying tools at another time, or be assigned in the winter to some bridge erection work. The same arrangement may be worked out for gasoline-engine generator sets.

Fifteen years ago demonstrations of devices to save labor in maintenance of way work aroused interest, but this was essentially academic and to most railway officers these innovations seemed to involve such sharp departures from accepted practice that efforts to promote their sale met with many discouragements. But the development period for a great many appliances has been definitely completed and it now requires only a thorough realization of a period of intensive utilization to effect outstanding economies in maintenance of way work.

In Next Week's Issue

The cost of providing l.c.l. freight service is excessive because of the lack of flexibility of freight car transportation. This flexibility and its resultant economy may be obtained through the substitution of motor trucks or tractors and trailers for railway equipment, both in terminals and in short line-haul operations. Large savings, already enjoyed by those railways which have effected such substitutions, are within the reach of other lines also. How trucks, tractors and trailers can be used to advantage by railways will be the subject of the next article in this series, to be published next week.

Railway Problem Attracts Wide Attention in Canada

OTTAWA, ONT.

ALARMING and persistent declines in railway earnings which operating expense reductions have not been able to overtake has drawn the attention of Canadians to duplications of services, on land and sea, of the two principal railways. There appears to be a widening public which believes that only an amalgamation of the Canadian Pacific and Canadian National will save the roads, the taxpayers and the shippers.

During the last session of Parliament at Ottawa one lone voice, that of John T. Hackett, a Montreal Conservative member, was heard advocating a merger of the two systems, but since then converts to this view are multiplying and there appears to be little doubt that at the next session of Parliament there will be a serious discussion of this proposal. It remains to be seen, however, whether advocates of a change will favor government operation of the Canadian Pacific as well as that of the Canadian National, or whether they will prefer merger under private management.

It is no secret that Premier R. B. Bennett is deeply alarmed over the situation and regards it as the most serious problem before the country. What is more important is that many people—taxpayers and shippers—are advocating some kind of joint control, and this question had the place of honor at the annual convention of the Canadian Chamber of Commerce at Regina, Sask., last week. George C. McDonald, president of the Chamber and a prominent Montreal business man, paid much attention to the present railway problem. What Mr. McDonald said is what a large number of Canadians are saying privately and even publicly:

"I consider that the McAdoo award, whereby the em-

ployees of the railroads in the United States and Canada got a remuneration greater than similar employees in other lines of business, is one of the more important of the minor causes of the unstable business conditions that we are facing today. The business men of Canada are naturally much interested in federal taxation. In the past we have perhaps given more attention to the forms of taxation than to the real essence of the situation, which is the amount that has to be collected to meet the federal expenditure.

"The most important, in fact the almost overwhelming, factor in our debt is that portion of it caused by the Canadian National. May I remind you it was not mainly at the instance of highminded believers in public ownership that the Dominion took over these railways. Rather was it that the result of bad management, exploitation, and the exercise of bad business ethics led the government to try to save a bad situation. Whether the situation is being saved or not is a matter that demands our most careful consideration.

"That the material condition of the railroads has been enormously improved, nobody will deny, but when it comes to consider the cost the figures may well make the strongest advocate of public ownership stop, and think and tremble. In studying this problem confusion is caused by the fact that in the accounts of the government, account is not taken of interest on loans and advances, whereas in the company's accounts provision is made for interest on the gradually increasing operating loss, though not on moneys advanced for capital expenditure. I may say that the figure of this operating loss, referred to by Mr. Bennett as advance for the running of the enterprise, has now reached the sum of $604,000,000. The addition to the capital liability since 1923 has been $400,000,000. The total of the advances to the Canadian National, Canadian Government Merchant Marine and Canadian National Steamships since April 1, 1919, is $1,663,675,517.61.

"Do you appreciate the effect of this expenditure on our federal debt and that had we not had these enterprises on our hands since April 1, 1919, there could have been a corresponding amount, plus the interest on the money advanced for capital expenditure, available for the reduction of the debt? This would have cut it almost in half.

"May I draw your attention to one or two other factors that stand out.

"1. A comparison of the operating figures for 1923 and 1930 shows no improvement despite the expenditure of $400,000,000 on capital in the meantime. The figures are:

	1923	1930
Railway Operating revenue	$254,926,000	$250,369,00
Total working expenses	238,550,000	234,324,000
Net profit (before interest)	16,376,000	16,045,000

"2. The prospects are that the earnings for 1931 will show a very considerable reduction.

"3. Premier Bennett's remark—

'Yet so far as I was able to ascertain, not one single capital request made by the management of the Canadian National Railways during the last eight years was refused by the late government.'

"4. There appears to be no evidence that the railway has been conducted subject to the law of supply and demand.

"5. For the eight years from 1923 to 1930, the amount available to pay interest was $228,900,000, or an average of $28,612,500 per year. This represents 6 per cent on a capitalization of $572,250,000. This is just a little better than paying interest on the new capital expenditure during the period. The question of recapitalization has also been discussed. What would be thought of a capital based on the earning power shown above something in the neighborhood of $600,000,000, or about one quarter of the value shown on the books?

"If the Canadian National Railways was anything but a government enterprise it would long ago have been subjected to the process of liquidation. May I just refer to the position of the Canadian Pacific Railway and the effect on it of competition from an organization that is getting the country into debt in the manner disclosed.

"My conviction is that something drastic must be done, and that very soon. The situation is that we have two organizations nearly always dpulicating the work of each other both in equipment and service, where there is work for only one. It seems that something could be done to bring them under joint administration by some controlling body whereby the duplication could be eliminated and enormous savings effected to the great benefit of all parties concerned."

At another session of the Chamber of Commerce in Regina a resolution was adopted urging the federal government to take appropriate action to eliminate all unnecessary duplication and unreasonable competition—

"It is suggested that if necessary, an independent commission be appointed to study the railway problem in all its major aspects and to make definite recommendations in connection with (first) the investment in Canadian railways in relation to the service required and the policy that should be adopted regarding extensions of lines or services; (second) the question of eliminating so far as possible all unnecessary duplication and uneconomical competition between the C.N.R. and the C.P.R."

The competition the railways are suffering from trucks and buses is still receiving attention and C. R. Moore, general superintendent of transportation for the Canadian National, speaking at the National exhibition in Toronto last week said it should not be assumed that the railways were opposed to highway or other forms of competition based on economic principles and improved service, but the railways did ask for fair treatment by adequate supervision of highway transport by regulatory bodies, so that existing discrimination would be eliminated.

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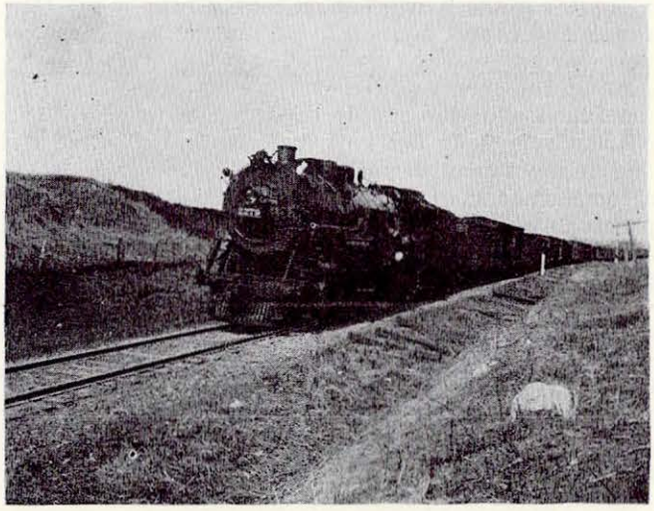
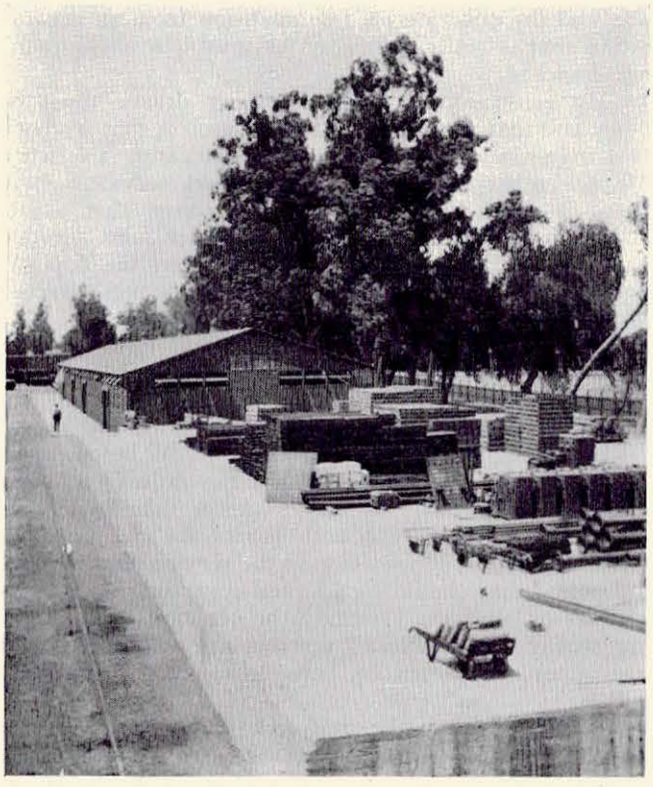


On the Wabash, near Moberly, Mo.

The picture shows train No. 91 westbound on a one per cent grade with 2,650 tons of merchandise, and with the locomotive booster in operation.

What Junior Storekeepers Say About Supply Work

Contest papers show keen interest of younger men in railway purchasing and stores problems and suggest improvements



Santa Fe Stores at San Bernardino, Cal.

WHAT are the younger men on the railroads thinking? How do they respond to their instructions and assignments? What are their views on problems they must help to solve? What have they to suggest in the direction of railway improvement and progress? As applied to railway supply work, these questions find an answer in the collection of papers submitted in the fourth annual contest held by the Purchases and Stores division, American Railway Association, for expressions from railway employees on purchasing and stores activities. A keen appreciation of the function of the supply departments to provide an efficient service to users of material and to avoid excessive investment in unapplied stocks and pride in the accomplishments of the departments are attested in these papers in which the understudies of supply management also register sundry recommendations for supply improvement.

There are many ways in which the service of the stores department may be extended and improved, writes J. C. McLendon, division storekeeper, Atlantic Coast Line. One is by building up confidence in the supervisors of the maintenance of way and signal departments and gradually taking over material and supplies for these departments. Another way is by the inauguration and expansion of an efficient stores delivery system on those lines which have not yet taken advantage of this means of service; also by the installation of sectional stockkeeping at points where it is not now used. An introduction of such practices, he adds, may often be made on a small scale without expense. After the small-scale operations have proved their merit, the resulting co-operation of the using departments will hasten their expansion.

In the latter part of 1928, adds A. T. Cronenberg, stock clerk, Atlantic Coast Line, we took over the ordering of telephone material for the entire system with a $13,026 stock turned over to us by the telephone department. With the aid of our stock book, we have been able to reduce this stock to $8,935.

The depression, writes John Drennon, chief clerk to the district storekeeper, Missouri-Kansas-Texas, has proved that the purchasing and stores department is an efficient and loyal organization and capable of upholding its assignment in a crisis; but, also, it has disclosed some of our weaknesses. An energetic study, he writes, should be made of the methods on the railroad, with a view of adopting the best. It should be determined which is the better—the stock book or card system of stock records. Studies should also disclose the advantages of either the past-consumption or budget system. A definite stand should be taken on the limits to which the stores department should have complete control over the ordering of materials and also over the materials after they have been received.

We should have figures on the type of equipment and quantity to handle a certain size stock, taking into consideration the extent of the service rendered the using departments, he adds. It should also be generally known what volume of materials handled would justify the installation of equipment peculiarly adapted to the handling of a particular class of material.

Supply Train Costs

How should distribution be made from the concentration stores to the outlying points, is another question raised by Mr. Drennon. If by supply train, should it include the distribution of all materials to both store and mechanical points, as well as to the maintenance of way department? Should the supply train handle both materials required for current requirements and improvement work? Should the supply train handle the material up to the point of final storage or the job, if in progress, or should it unload material at the most advantageous point and leave part of the handling to the department to which the material is consigned? If it is not recommended that the supply train distribute all materials from the concentration stores, should skids be used for both carload and less-than-carload shipments? If so, to just what service should skids and lift trucks be assigned?

Next, he points out, is the question of distributing material at the shop points. Is store delivery the best method of distribution at all shop points? If not, what are the determining factors that justify this class of distribution? Recommendations should be made on the extent of such operation and the proper equipment necessary for a given volume of material distributed and class of service rendered.

C. E. Page, assistant general foreman, Missouri Pacific, also raises the question of whether the stock-book system of maintaining records, with its system of checking and ordering material, has kept abreast of the changing conditions, his view being that the ordering of material and the maintaining of stock records should be done at the place where the material is located, whether in a store-room or material yard by the man who sees the material daily, and that the panel-card system affords a much more complete field for this than does the stock book.

Cards for Stock Books

We are fortunate on the Canadian National, writes C. D. Bolduc, stores foreman, Canadian National, in having the panel card stock-control system, which has proved to be the most efficient method devised for the economical control of books. The cards, he states, allow the keeping of bin cards and panel cards in perfect alinement, regardless of the shifting of stock. A saving of time in placing requisitions results because it is only necessary to show the quantity to be ordered in the space provided and insert a marker card behind panel card. The marker card shows through the perforation and requisition and the clerk deals only with cards showing signals. This eliminates the writing of requisitions and avoids the possibility of errors. The photostating of the inventory eliminates pricing, calling, checking and typing. The use of colored clips permits the quick identification of surplus material, protective stock, material held a year or more at the request of the using departments, and material specially ordered, of which delivery has not been taken.

Standard Practices

Mr. Bolduc also advocates the use of standard practice books. They give, he writes, all the necessary details to enable stores employees to carry out all major operations according to approved methods and provide a ready reference. Many operations are simplified and obsolete methods are discarded. These books also insure that work is being carried on in all stores according to the approved plan. Mr. Bolduc also states that since shop foremen have been provided with requisition schedules, a reduction of special requisitions has been noted.

Sectional Stock-Keeping

J. F. Anderson, assistant storekeeper, Atlantic Coast Line, advocates sectional stock-keeping. In all the department stores of our large cities, he writes, each clerk is assigned certain materials to handle. The clerk handling the same material each day knows what is selling best and can so inform the buyer and keep the stock turnover higher by keeping goods the public demands. If this applies to department stores, he asks, why not to railroad stores also? Sectional stock-keeping is really up-to-date storekeeping.

Protective Materials

It is advanced by G. M. Byers, chief clerk to the division storekeeper, Erie, that there should be some means of more accurately maintaining and allocating stocks of protective materials. A complete and accurate analysis, he says, should be made of the individual items. As the new power grows older, past consumption of parts will be more detrimental than helpful as a means of ordering. Any information that can be secured from using, engineering or purchasing departments, relative to the usage, probable life, or difficulty in purchasing likely to be encountered, should be shown on the stock book opposite the individual item of material.

Carrying the bulk of protective materials at general or district storehouses, he adds, protects a larger number of units of power with a smaller stock than can be accomplished by carrying at local points, except in the case of material not in general use. Due to the small stock usually carried on hand, it is imperative that as soon as stock is depleted it be immediately replaced.

Tags for Surplus

He further advocates that protective material should be tagged. A tag with a distinctive color and perforated so that it could be torn in half is suggested. The class and item number and brief description of material should be placed on the tag; also the date material is received in stock and the number of units to be carried. When the supply is reduced to the minimum allowed, the tag should be detached and one part used as a reminder to re-order immediately, the other half of the tag to be left in the bin to serve as a guide in preparing a new tag. The date on the tag would also aid in weeding out material not actually required for protection, particularly at local points.

Scrap Handling Facilities on the Northern Pacific at Tacoma, Washington

The tag is also advocated as a means of disposing of surplus material, by A. Volney Bass, requisition clerk, Canadian National. It is customary on several roads, he writes, to use a red tag for this purpose.

Pricing the Stock

In this day of strong competition, writes H. L. Blackburn, local storekeeper, Chicago, Burlington & Quincy, the roads should not only advertise outside of their premises but should advertise and price their goods in the storehouse the same as the independent merchant, thereby educating employes as to the cost and value of the various items of material that it is necessary to have to run a railroad successfully. Some of the railroads already follow the practice of showing price of an item of material on the item or on the rack where the different kinds of material are stored.

To control stock properly, it is necessary that the storekeeper be constantly in touch with the using department, emphasizes J. S. Lough, assistant to storekeeper, Atlantic Coast Line. Every day a visit should be paid to the head of each department, and his material requirements discussed, and he should discuss his program with the storekeeper. Each should be well informed as to the other's problems and plans. The storekeeper should be one of the first men to be notified when a certain class of cars or locomotives are to be given special or preferred shopping, and the mechanical officers should be made to feel that their material problems are problems belonging to the storekeeper, but neither department can work independently of the other.

Controlling A. F. E. Material

Officers requesting items on budgets, writes J. W. Kelso, assistant division storekeeper, Southern Pacific, should be required to prepare the detailed cost of each job before submitting for budget purposes, particularly detailing the material necessary to complete construction of the facility requested. When authority is given, the work is usually started at once, and every effort made to bring job to completion, which leaves the stores department with urgent requisitions for immediate delivery of many items not in stock. On western railroads, it is necessary to obtain deliveries in eastern markets.

Thought should be given to the programming of A. F. E. work so that users will be assured of an even flow of materials to the job when it is required. Sufficient thought has not been given to the placing of contracts for material purchases so they will reach the railroads when material is required. Details of each rail renewal job should be furnished purchases and stores department sufficiently in advance of approval to assure the receipt of all the items necessary for the job. Material for bridge and building work should be listed and furnished to the stores department sufficiently in advance of commencing the work so that it can be available when required.

Turnover

In connection with the monthly inventory, says C. C. Daughtridge, assistant to division storekeeper, Atlantic Coast Line, mention should be made of the "minimum marker." This marker designates the minimum amount to be carried in stock and serves as a basis when to order. This information serves as a protection, from one monthly inventory to another, to items where unusual demands have been made. When a stock attendant issues an item that lowers the amount to or below the minimum amount to be carried, he reports it to the sectional stockman at once. This method has been a great source of protection on the Atlantic Coast Line, especially with stocks reduced to a minimum.

Standardization and Simplification

Mr. Daughtridge also urges standardization and simplification, stating that it has also played a major part in attaining a good stock turnover. It has reduced the number of items that were formerly carried in stock and whenever a reduction of items is made, it naturally reduced the value of stock carried. We have in mind, he writes, several items where much money is involved. One item is now carried in stock in place of three or four. With such items as car roofs and truck bolsters, we can supply the demand with about half the investment we formerly carried, and the stock is much easier maintained.

Reference Numbers Help

W. J. Adams, requisition marker, Pennsylvania, advocates the use of reference numbers. A numbered system, he writes, induces brevity in description and reduces the expectancy of error. All of the items of material to which numbers are applied will naturally include, in each case, a complete description of that item, together with an indication of the unit by which it is customarily ordered. This prevents over-ordering of material, due to misunderstanding of the unit involved.

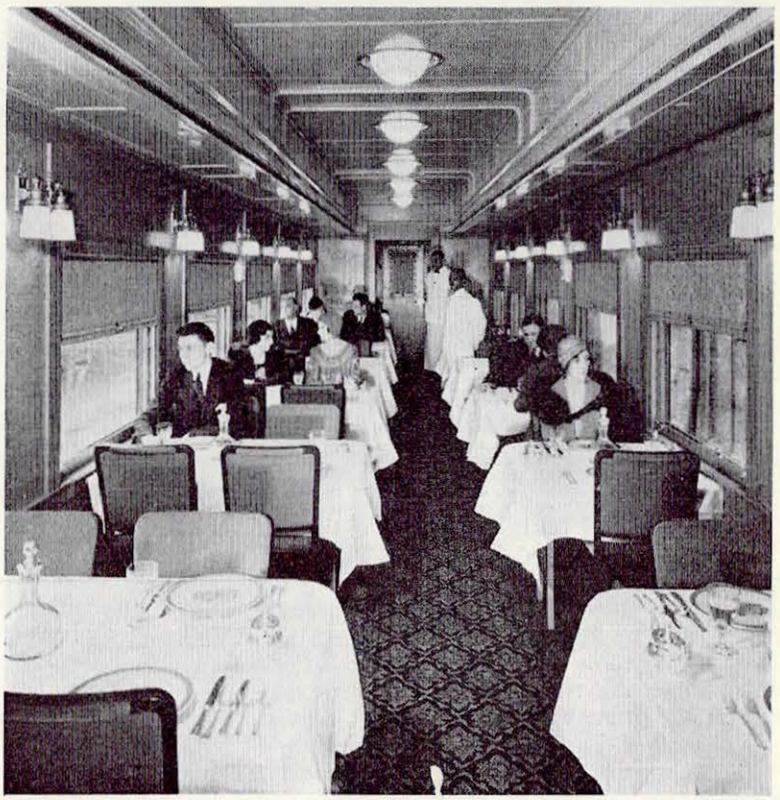
The benefits are applicable to the entire railroad, Mr. Adams claims. To the local storekeeper, a standard reference number will result in valuable assistance in the physical arrangement of his material, the maintenance of his records, and in the proper charging of the cost of material. To the consumer, a standard reference number is a brief, concise and accurate means of identifying the standard item, and is a constant reminder and encouragement pointing toward further standardization of his requirements. To the purchasing agent a standard reference number is a means of sure and rapid handling, quick and accurate identification of the item ordered

(Continued on page 442)

Handling Lumber for Mill Work on the Missouri Pacific

Katy Operating Air-Conditioned Diners on Its "Texas Special"

Trial installations have been favorably received by patrons — Western pioneer motif followed in interior decoration



Interior of One of the Three Missouri-Kansas-Texas Air-Conditioned Diners

THE Missouri-Kansas-Texas has had three air-conditioned dining cars in service since last June on its through trains the "Texas Special" and "Bluebonnet," which operate between St. Louis, Mo., and San Antonio, Tex. These cars are operated the larger part of the time between Denison, Tex., and San Antonio. It is reported that the cars have been exceptionally well received by the passengers and have been influential in attracting passenger business. The cars, which were built at the St. Charles, Mo., plant of the American Car & Foundry Company, are approximately 82 ft. long overall. The dining compartment measures 38 ft. 4 in. long by 9 ft. 3 in. wide and has a seating capacity for 36 persons. The inside length of the kitchen is 17 ft. 5 in.; pantry, 7 ft. 3 in., and buffet section, 6 ft. 9 in.

All three cars are equipped for air conditioning, the equipment for which was designed by the Carrier Engineering Corporation, Newark, N. J. As shown in several of the illustrations, the ducts and other apparatus pertaining to this equipment are well concealed and do not detract from the general appearance of the car, but blend well into the scheme of interior decoration.

The ceiling, and upper and lower decks and hallways are finished with Sanacoustic tile, a combination of hair felt placed behind perforated Burgess metal and designed to absorb interior noise, such as handling of dishes or silverware, and conversation.

Double plate-glass windows, giving ample light and clear view of the passing scenery, are located at each table in the dining room. They have brass sash completely weatherstripped. Each window is fitted with Tuco Royal window screens with bronze frames and curtains of gold colored silk-faced Pantasote.

There are six lights in the upper deck, one over each set of tables, and ten two-light wall-bracket fixtures, five of which are located on each side of the car. These light brackets are placed on the wall panels between the tables and serve the dining compartment. Other lighting fixtures are placed as necessary in the entrances, hallways, kitchen, pantry and buffet.

Six tables are located at either side of the car, those on one side accommodating four persons each, and on the other side, two each. The 36 chairs are made of aluminum and are light and easy to handle. They are finished in standard walnut and are comfortably upholstered.

Two of the cars have interiors finished with lacquer of ivory color and have blue carpets and chairs upholstered in blue velmo. The other car is finished in green, beige carpets and beige velmo upholstered chairs. Four beautifully executed murals, each representative of one of the states through which the M-K-T operates, are placed in each car, on the bulkhead panels at each end.

The chinaware for general service is specially decorated with standing sprays of the bluebonnet, the state flower of Texas. The service plate is decorated with a picture of the Alamo forming the center and a wide border on the rim. All of the china is original in its design.

Body Construction and Insulation

The cars are of steel construction, with the exception of the necessary nailing stringers in the floor, wood furrings in the side walls, and wood flooring in the kitchen and pantry of the cars. The body is constructed with steel underframe members extending the full length of the car, the bolsters and platforms being cast integral. The ends, which are of anti-telescoping design, are of cast steel.

The diners are equipped with six-wheel trucks which

The Air Ducts Are Effectively Concealed

are insulated at the center plates, spring seats and tops of journal boxes with Linatex—specially processed crepe-rubber pads manufactured in the Malay Peninsula. The use of these pads is intended to eliminate, so far as possible, the transmission of noises inherent in the operation of trucks to the body of the cars. The buffers at each end are similarly insulated.

The cars are further insulated against temperature changes by the use of three-ply Salamander between the various members of the floor, side walls and roof. The floor in the dining room is of Masticoke, 5/8 in. thick, laid over steel truss plates, forming a solid monolithic floor on which the Ozite carpet cushions and carpet are applied. The side walls and roof, the latter of the clerestory type, consist of steel Z-bars, angles and pressed shapes, with steel sheathing and hood sheets, also insulated.

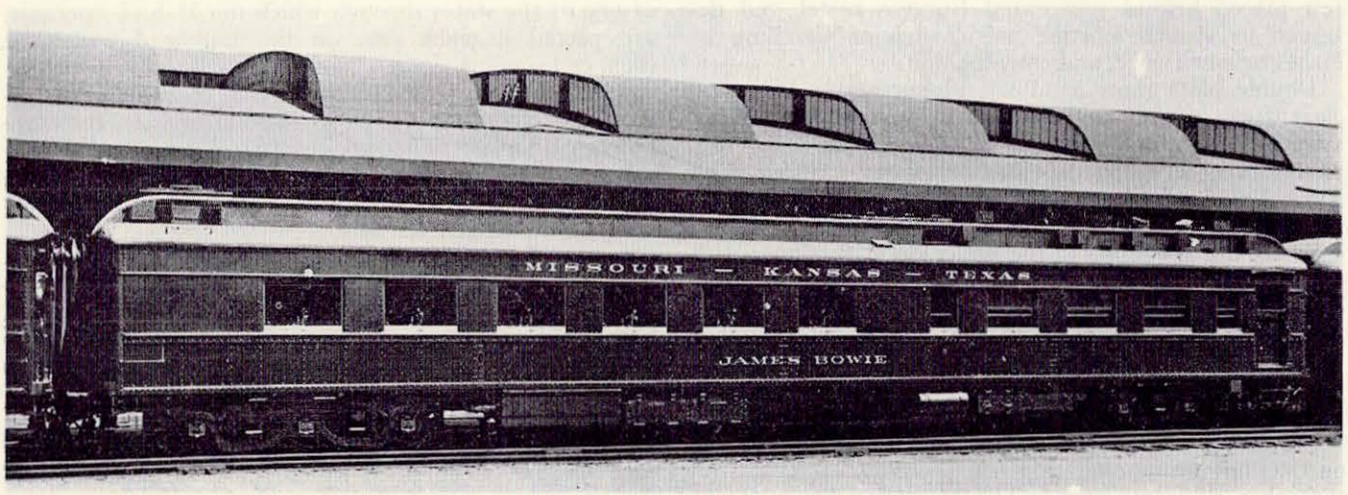
The identical air-conditioning plants applied to each of the three diners are sufficiently complete in detail to accomplish the desired result; namely, air conditioning within the dining room space. With the exception of occasional servicing, such as replenishing the condenser-water, supplying electrical energy when the train is standing for long periods and providing steam for heating during cold weather, these cars are independent units. The electric power for the 32- and 115-volt equipment is derived from two axle generators, one 32 volts, the other 115 volts while the train moves above a certain speed, but below that speed the 32-volt equipment operates from the storage battery, while the 115-volt equipment is idle. The steam energy for heating depends on either the locomotive while in the train, or on some other external source, if the car is detached.

Cool conditioned air is supplied without draft for the passengers in the summer, warm air to maintain even heating for the passengers in the winter, and for both purposes the air is clean by virtue of the mechanical filters which free the supply of outside air from soot, cinders, and other foreign matter. These filters are located in the outside air intakes, just behind the air conditioning apparatus in the center of the car.

Air conditioning within the cars is effected directly by the apparatus over the buffet lobby and consists of a dehumidifier, heaters, fans, filters, thermostats, return and recirculated air dampers. The system may be used either for heating or cooling by simply turning on one or the other of two small valves conveniently located by the pantry door.

For cooling, or dehumidification, the return and recirculated air dampers operate to control the temperature within definite limits. A supply of filtered outside air is mixed with a quantity of air drawn from the car up through the return dampers and then drawn through the coils, at which point, before entering the fans, the dehumidified air may or may not be mixed with air which has come up through the by-pass dampers. This latter quantity is dependent upon the prevailing temperature in the car. The final mixture of air enters the 32-volt motor-driven fans, from which it is sent into the overhead ducts to be distributed uniformly through the car.

The medium for cooling the coils through which the air passes is water circulated between the coils and the refrigerant evaporator (or cooling tank), by means of a 32-volt motor-driven pump. Interposed between the cooling coils and the evaporator, and in the water circuit, is a large tank which serves as a cold storage to maintain a fairly uniform rate of car cooling during



One of the M-K-T Diners at the St. Louis Passenger Station

periods when the 115-volt motor-driven units; namely, the refrigeration compressor, the cooling tower and the condenser-water pump, are not in operation because of no power. This lack of power is occasioned by the fact that below a certain train speed, including standing, the 115-volt axle generator will not deliver the rated capacity; there are no 115-volt storage batteries. The cars will remain cool with only a comparatively, small change in the condition of the air for approximately one-half hour with the 115-volt generator idle.

If the train is to remain standing for a long period of time, such as terminal stops, and cooling is desired, a motor-generator set is provided which operates from an outside source of three-phase 220- or 440-volt alternating-current power and supplies 115-volt, direct-current power for the operation of the motors driving, respectively, the compressor, the cooling-tower fans and the condenser-water pump. This set is mounted under the car.

The Return-Air Grill is Located in the Ceiling in Front of the Buffet—Recirculation of Air from the Dining Compartment Holds the Hat Against the Grill

The refrigerating equipment consists of a compressor, condenser, and an evaporator, all located beneath the car. Auxiliary to this equipment is the cooling tower with the condenser-water pump. This cooling tower is located overhead at the front or steward's end of the car and, therefore, requires no floor space.

The compressor draws the refrigerant vapor from the evaporator where the water for the air-conditioning apparatus is chilled. The vapor is then compressed into the condenser where its heat is removed by the condenser water. From the condenser the refrigerant leaves as a liquid to re-enter the evaporator via the expansion valve, for further duty of cooling the air-conditioning water.

Because of the fact that only a limited supply of condenser water can be carried on a car, it is necessary to conserve it by recooling after leaving the condenser, instead of throwing it away. To accomplish this purpose, use is made of a cooling tower, mentioned in a previous paragraph. On these dining cars some entirely new features are brought into play in respect to this unit.

The condenser-water pump forces the water through the condenser and on through to the spray chamber of the horizontal overhead tower. Here, outside air which is pulled through the tower by the fans is brought into contact with the sprayed water, a very small part of which is evaporated, the remainder falling to the inclined pan to flow out immediately to the make-up tank standing vertically beneath. Within the cooling tower is a Carrene condensing chamber so arranged that it is continually wetted by the sprayed condenser water. Carrene is a harmless liquid refrigerant which is used for compressor-jacket cooling.

An interesting feature concerning the arrangement of the make-up water tank is that no float valves are needed to maintain a constant quantity of water for circulation in the system. The cooling tower drains into the top of the tank, and the condenser pump draws the water out of the bottom. At the start the tank may be full, while at the end the tank may be nearly empty. Another interesting feature of the condenser system are the automatic dampers of the cooling tower. When the system is shut down, these dampers are closed to prevent the entrance of cinders, dirt and other foreign matter. When the system starts up, the dampers open by virtue of elements expanded by water pressure in the spray headers. On the system being shut down, the pressure ceases and the elements contract to close the dampers.

Precautions Taken During the Heating Season

Unless precautions were taken, the presence of water in the system on these cars would present a potential danger of freezing during the seasons of uncertain temperatures; that is, during early spring and late fall. Thus at a definite date the water in the cooling coils and evaporator is changed to a solution of alcohol and water, while the condenser-water system is paralleled by steam pipes, to which steam is admitted by an automatic valve. The sensitive end of a bulb which controls the automatic valve is located in the condenser water and, when the temperature falls to 40 deg. F., the valve opens. Usually the compressor jackets are cooled by circulating condenser water, but on these cars, the jackets are cooled by Carrene to eliminate the danger of freezing during cold weather.

The system is not drained because of the desirability of holding it in readiness for either cooling or heating at any time. For example, during the late fall the weather may be freezing around Kansas City, Mo., and heating may be desired. On the same trip south, however, the weather may be warm enough around San Antonio to warrant using the cooling system.

An interesting feature of the control which responds to change of outdoor temperature should be mentioned. Should the steward start the entire system during a time of the year when the daily temperatures may change from high to low quite rapidly without his becoming cognizant of the fact, the compressor will shut off automatically.

Should the need for refrigeration arise again, the compressor will start again automatically.

As previously stated, the system is switched from heating to cooling by turning one or the other of two small valves. When it is set for heating, an automatic valve controls the passage of steam to the heater unit and warm air of the proper temperature is circulated.

The entire system is started or stopped by one push button. The motor-control panel is of the magnetic accelerating type and is interlocked with safety features in the equipment. The panel is sufficiently flexible to allow the individual operation of the units as well as the group as a whole.

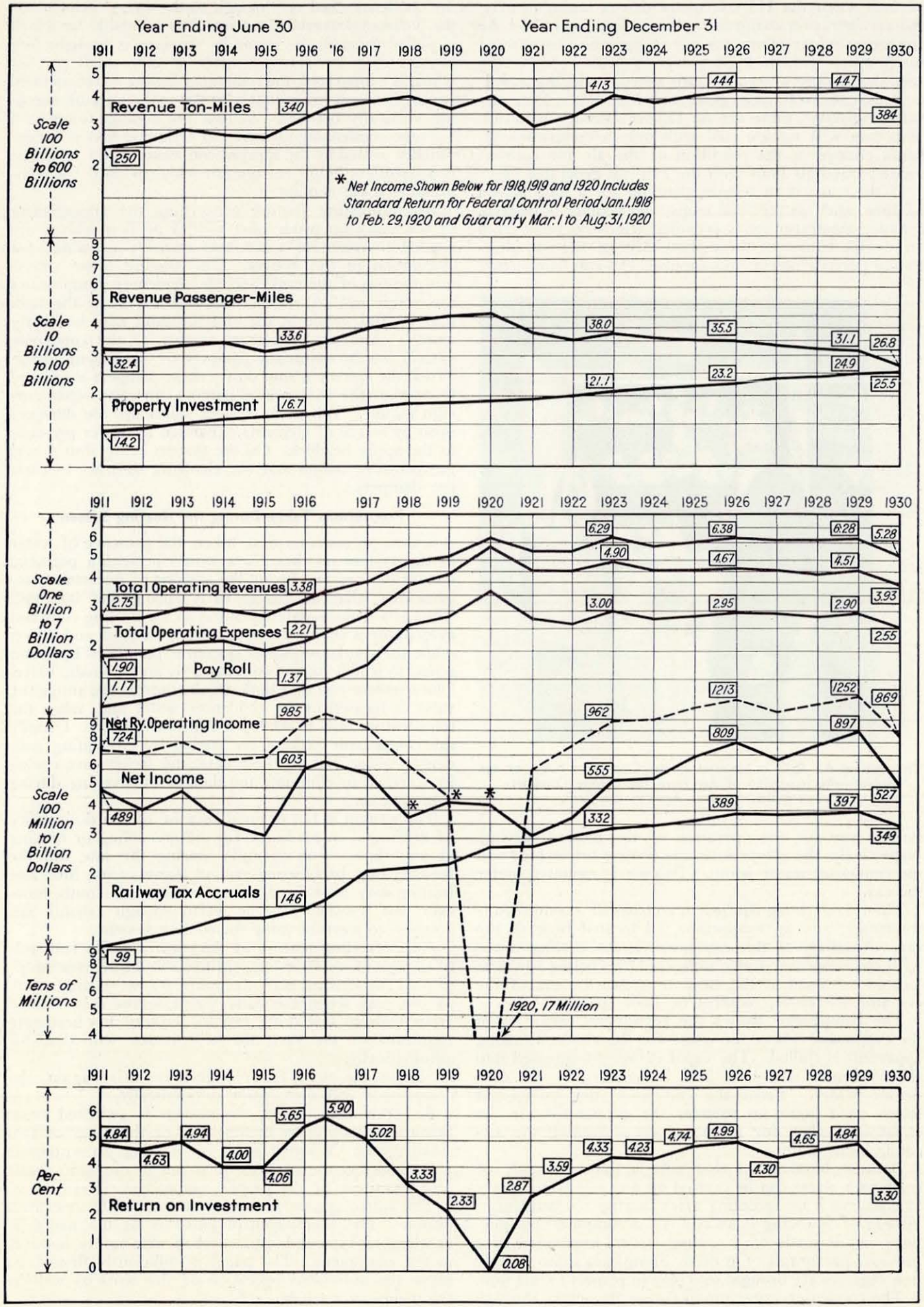

Year Ending June 30
Year Ending December 31
1911 1912 1913 1914 1915 1916 '16 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930
Scale 100 Billions to 600 Billions
Revenue Ton-Miles
340
250
413
444
447
384
* Net Income Shown Below for 1918, 1919 and 1920 Includes Standard Return for Federal Control Period Jan. 1, 1918 to Feb. 29, 1920 and Guaranty Mar. 1 to Aug. 31, 1920
Scale 10 Billions to 100 Billions
Revenue Passenger-Miles
33.6
32.4
38.0
35.5
31.1
26.8
Property Investment
16.7
14.2
21.1
23.2
24.9
25.5
Scale One Billion to 7 Billion Dollars
Total Operating Revenues
3.38
2.75
6.29
4.90
6.38
4.67
6.28
4.51
5.28
3.93
Total Operating Expenses
2.21
1.90
3.00
2.95
2.90
2.55
Pay Roll
1.37
1.17
Net Ry. Operating Income
985
724
962
1213
1252
869
Net Income
603
489
555
809
897
527
Scale 100 Million to 1 Billion Dollars
Railway Tax Accruals
146
99
332
389
397
349
Tens of Millions
1920, 17 Million
Per Cent
Return on Investment
5.65
4.84
4.63
4.94
4.00
4.06
5.90
5.02
3.33
2.33
0.08
2.87
3.59
4.33
4.23
4.74
4.99
4.30
4.65
4.84
3.30

Chart 1

Charts of Earning, Investment and Traffic for Two Decades

Freight traffic peak in 1929 but revenues reached apex three years earlier—Passenger traffic decline and growing taxes are serious problems

By Henry M. Sperry, M. Am. Soc. C. E.

THE purpose of this article is to present in simple graphic form a picture of what has taken place with respect to railway traffic and earnings prior to and during the present depression. The article brings up to date a more or less similar discussion by this writer which appeared in the *Railway Age* of November 5, 1927. The figures given at that time were up to the end of 1926 and the graphs trended upwards. The data in the present article are complete to the end of 1930 and in part to the middle of 1931. A different and much less satisfactory view is in evidence because the graphs now trend downwards.

Two charts are shown. Chart I shows on a single page a complete picture of railway traffic and earnings for the twenty and a half years beginning with the fiscal year ended June 30, 1911, the first year in which figures for the Class I railways as such were compiled or totaled. The feature of this chart is that, although no less than ten curves are shown, in only four places does one curve cross another—namely in 1920 when net railway operating income was so low as nearly to approach the vanishing point. This result is obtained by using the semi-logarithmic or ratio scale whereby all the curves are shown in a limited space in spite of the fact that the amounts vary between less than 100 millions on the one hand and approach 450 billions on the other.

Essentially, however, the value of the ratio scale lies in the manner in which it assists in presenting the true relationship between the figures. An increase or decrease of a given percentage in any item will show the same degree of upward or downward inclination regardless of the magnitude of the item or its position on the chart. If the ordinary arithmetical scale were used, the fluctuation in the large items, could they be put upon the chart at all, would be more pronounced than and entirely out of proportion to the same relative fluctuations in the smaller items.

Chart I is in three parts. The upper part, comprehending a measure between 10 billions and 600 billions, shows the revenue ton-miles, the revenue passenger-miles and the investment in road and equipment as shown by the carriers' book accounts, exclusive of materials and supplies and cash.

Revenue ton-miles. The chart clearly brings out the rising trend of freight traffic volume up to the period of the war. It shows a flattening following the war and since 1923 a relative degree of stability, that is, until the sudden sharp drop for 1930.

Revenue passenger-miles. The curve shows that the peak of American railway passenger travel was reached in 1920, that there has been a continuing steady decline since, until 1930 where there was a sharp dip.

Property investment. There has not been a year in which the railroads have not added substantialy to the value of their plant and this curve is the only one that shows an increase instead of a decrease in 1930.

The second part of the curve, comprehending a scale between 40 millions and 7 billions, contains the curves of total operating revenues, total operating expenses, the payroll, the net railway operating income, the net income available for dividends and the taxes.

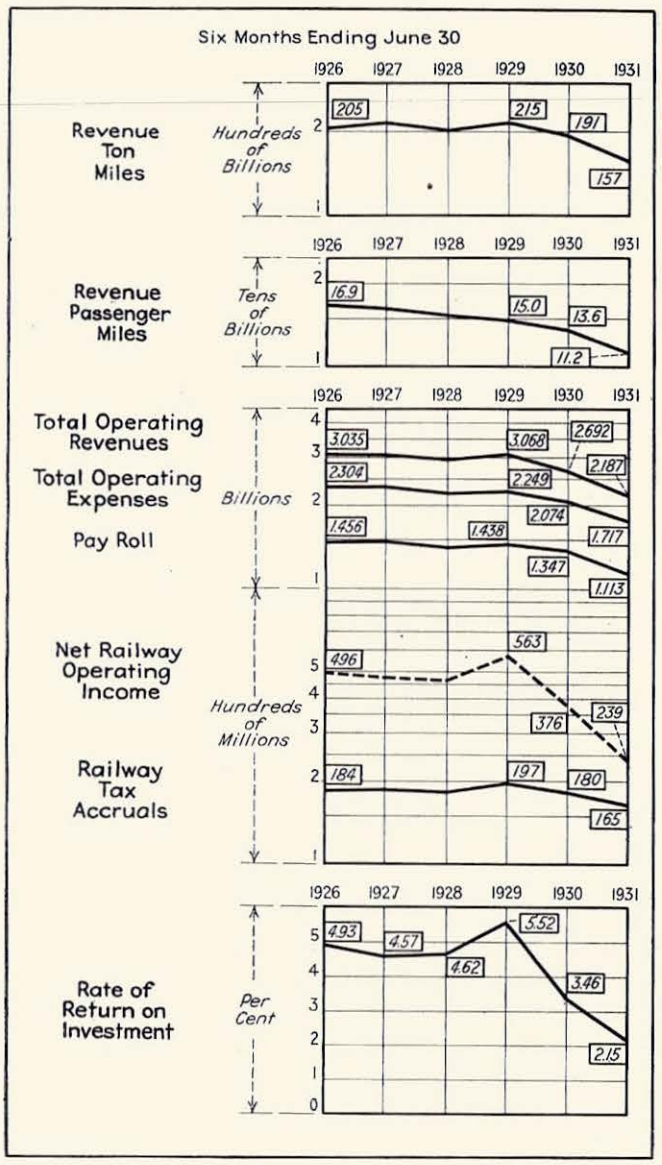


Chart II

Railway operating revenues. The curves of revenues expenses and payroll show a close relationship to the curve of revenue ton-miles although more detailed examination will develop certain important differences. Some of these are as follows:

The curve of operating revenues shows the same rising tendency to the war period and the relative stability since. However, whereas the ton-mile curve reached its all-time peak in 1929, the revenues curve did not rise as high in that year as it did in 1926. The decline in the passenger business and the gradual lowering of the freight ton-mile revenue average receipts are the most likely explanation of this difference.

Railway operating expenses. There will be noticed the gradual increase in spread between the revenues and expenses curves in the past ten years. The spread between the payroll curve and the total operating expenses line, however, maintains a striking relationship explained presumably by the fact that wage constitutes a major part of the carriers' total expense bill.

Net railway operating income; net income. These two curves which reached their low points in 1920 and 1921 respectively show a tendency to increase fairly consistently in the years following, indicating the railroads' ability through economies of operation to retain a larger and larger proportion of their total operating revenues. The chart at the bottom part of the chart, the rate of return plotted on a straight arithmetic basis, shows that the improvement was not sufficient to allow the railroads to earn the 5¾ per cent to which they are said to be entitled in Section 15a. The entire picture of course is changed for 1930. The fact that the net operating income, net income and rate of return curves show much steeper declines than other curves on the chart is especially significant.

Railway tax accruals. Except for 1930, the curve is ever upward. The decrease in 1930 is explained at least in part by the sharp decrease in federal income taxes due to the lessened taxable net incomes and the temporary reduction from 12 to 11 per cent in the federal corporate income tax rate. In 1930, nevertheless, taxes took over 6.5 cents of every dollar of revenue; in 1929, 6.3 cents, so that, even though the total amount was less, the relative burden was greater.

Chart II needs little explanation. Its purpose is to bring the larger chart up to date, in other words, to chart the figures for the first six months of 1931, the latest at this moment available. It being impossible to compare first half year totals with annual totals, the method was followed of making new graphs of six month's totals for sufficient years to constitute a reasonable basis of comparison. Thus there are included six years, 1926 to 1931. This chart evidences a decided degree of stability for the first four of this half dozen years, a sharp decline in 1930 and a further decided fall as between 1930 and 1931.

Chart II lacks two of the graphs of the larger chart, property investment and net income, six months figures for these two items not being available. It will be understood that the rate of return—only 2.15 per cent for the first six months of 1931—is computed on the investment of the carriers as shown by their books, including materials and supplies and cash, as of the beginning of the year and is computed so as to reflect seasonal fluctuations in traffic and earnings.

The basic data for Chart I were chiefly obtained from the annual statistical summary of the Bureau of Railway Economics entitled, "Statistics of Railways of Class I." The figures for Chart II were obtained from the monthly reports of the Bureau of Statistics of the Interstate Commerce Commission.

What Junior Storekeepers Say About Supply Work

(Continued from page 436)

with the same item in his price file, and, through the use of the addressograph plate, offers a ready means of issuing inquiries with the minimum of labor. The vendor, after a short space of time, becomes familiar with the use of the number as a ready reference for the item concerned and will use it in discussing the item by correspondence or telephone conversation with the railroad.

Training for Storekeeping

The locomotive firemen and engineers on a majority of railroads, writes O. D. Jones, locomotive storekeeper, Wabash, have what they term an enginemen's school of instruction. The mechanical department on most Class I railroads maintains an apprentice school. The store-department boys and men are to face these efficient mechanics in the near future and they should also be trained.

Most general storekeepers issue circulars on duties from time to time, numbering them consecutively, giving in detail the proper method of handling to conclusion certain phases of the work. This is like reading a history and remembering about 50 per cent of it. Studying, together with the application of the lesson to one's daily work or a certain part of it, will make any man efficient. There is a vast difference, he points out, between instructing and issuing instructions.

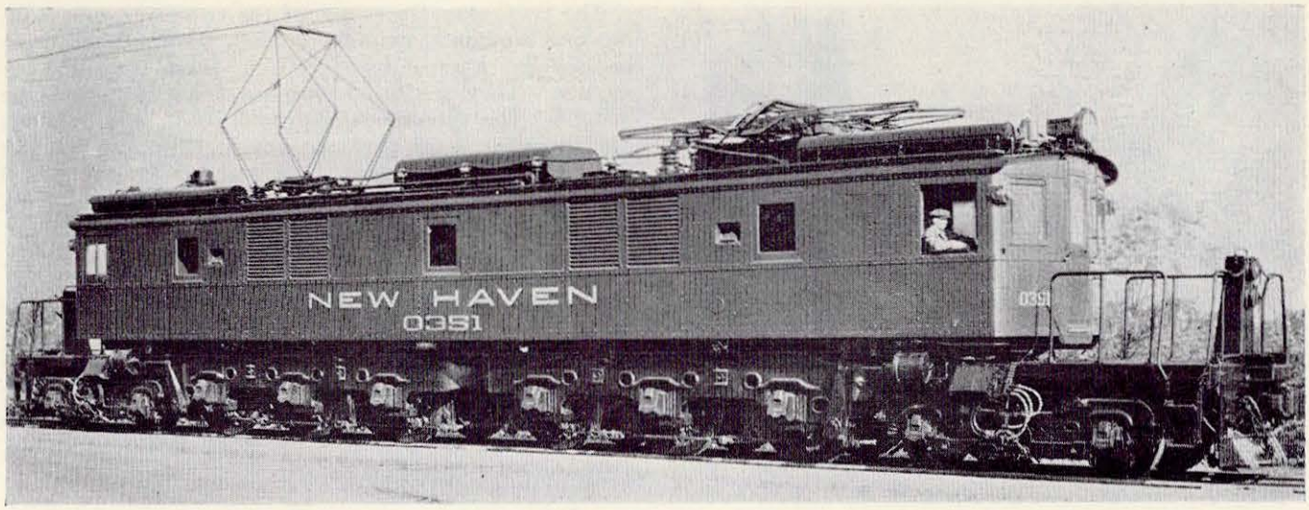
Getting Real Turnover

The supplies of a storehouse should be stored in such a way that the old material will always move first, T. M. Beets, shipping clerk, Louisville & Nashville, contends. This will, of course, depend a great deal on the arrangement of the storehouse. Stacks of kegs and other material should provide an opening at both front and back of the stack.

Surplus Lists

Inactive stocks, H. J. Cunningham, stock record clerk, Louisville & Nashville, writes, can sometimes be diminished, or an accumulated surplus reduced by advertising among the departments on the various divisions of the road for which the material was originally purchased. Two separate lists should be prepared—one for obsolete material and one for inactive material. The information on these lists should be complete as would be required in the making of a requisition. The number of months or years that the material has been in stock should be shown on the lists; also the date and amount of the last issue. This information would be a ready reference to aid those actually in charge of handling and disposing of the material.

It should be the duty of each employee, adds C. S. Jones, division storekeeper, Southern Pacific, authorized to make requisitions for supplies to familiarize himself with the value of material, new or second-hand, in order that economy can be secured. The users of material should be taught the value of such material and a saving can be established by making over or where repairs can be made, same could be done to avoid purchase of new. When issuing tools, lanterns, etc., an account should be opened with each employee, charging the new material to him and crediting the material he returns.



High-Speed Electric Passenger Locomotive

New Haven Receives Ten Electric Locomotives

Design provides increase of power without exceeding bridge-loading stress limits

DELIVERY of ten electric locomotives ordered last year by the New York, New Haven & Hartford is now being completed by the General Electric Company. The locomotives are designed for high-speed passenger service and will operate either on 11,000 volts alternating, or 660 volts direct current. The maximum speed is 70 miles an hour. The total weight of a locomotive in running order is 403,500 lb. and the weight on drivers is 273,900 lb. This involves a weight per driving axle of 45,600 lb., the arrangement and spacing of the wheels being such as to permit such weights without exceeding the bridge-loading stress limit required by New York Central viaduct conditions. The running gear is of the 2 — C + C — 2 type and the over-all length of the locomotive is 77 ft.

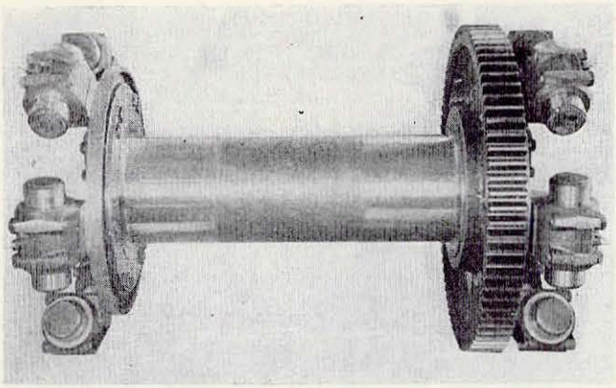
The locomotive mechanical structure consists of a box-type cab built on a cast-steel underframe with two driving and two guiding trucks each having integral cast-steel frames. The two driving trucks are connected with an articulated joint to take the draft stresses. This joint permits vertical movement and rolling action between the trucks but no lateral movement. Each main truck is arranged with three driving axles for three pairs of twin motors and has a two-axle guiding truck on its outer end. This guiding truck supports the main truck frame by means of a center plate and a swing bolster. The swing bolster permits the driving truck frame to swing sideways over the guiding truck frame when negotiating curves; 5½-in. maximum swing is permitted each side of the center. This is for the sharper curves, particularly those in the loop at Grand Central Terminal.

While a separate blower has been provided for the transformer and preventive coils, the air ducts have been so arranged that it is possible to supply air to this apparatus from the traction motor air duct, and to supply air to all the traction motors from either of the traction motor blowers, if necessary. This has been done to improve reliability in the event of a transformer blower or traction motor blower failure.

The trucks are side equalized by means of a spring system, using fabricated equalizers with semi-elliptic springs located above the journal boxes and coil springs at the ends of the equalization system. Approximately 80 per cent of the weight of the cab is carried on two center plates so located that the cab underframe just spans the six twin traction motors. The remaining 20 per cent of the cab weight is carried on four spring loading-pads located one on each side of the truck between No. 4 and No. 5 and No. 8 and No. 9 traction motors. The trains are heated by a vertical type oil-fired boiler located in the No. 2 end of the locomotive. The locomotives have a capacity of 15,000 lb. of water and 3,000 lb. of fuel oil, as compared with 7,260 lb. of water and 1,500 lb. of oil on the previous 0300 type locomotives.

The locomotive is equipped with a modified No. 14 EL airbrake equipment using two automatic brake valves, two independent brake valves and one distributing valve. Two brake cylinders are used on each driving truck. A high-power hand brake is mounted inside the No. 1 operating cab and furnishes braking power on the No. 1 driving truck. Brake cylinders (14 in. by 12 in.) are used with a braking ratio of 58 per cent which includes the armature effect of 8 per cent.

Twelve traction motors mounted in six solid fabricated twin frames are used. Two solid pinions per twin



Quill Drive

motor engage in a single solid non-resonant gear mounted on a quill. Two integral quill spiders each carrying six sets of spring cups are used with each twin motor. One quill spider is mounted on the quill at the commutator end of the motor and its spring cups engage with the wheel at that end. The other quill spider is mounted on a lip on the gear and its quill cups engage with the wheel on that end. The stops for the journal box in the truck frame are so arranged that the boxes come solid in the frame before the axle can strike the inside of the quill, should the frame tilt due to the breakage of a spring hanger or the axle drop in a derailment.

A three-point suspension is used for each pair of twin traction motors, two lugs being provided on one side of the motor and one on the other side. These sit on corresponding removable brackets bolted to the truck frame. Two of the lugs and two of the brackets are provided with slots in which a square key is inserted to hold the motors against buffing. By the insertion or removal of shims under the key it is possible to adjust the motors in the trucks so that the quills will always be central with the axles even though tires for one pair of drivers in the truck may become worn. Further adjustment is provided by means of the adjusting nuts on the ends of the spring hangers. Roller armature bearings are used, the commutator end bearing being of the double-lip type to take the end thrust. These bearings are grease lubricated.

The series GEA-621 traction motors have 12-pole multiple-wound armatures and laminated stators with partially open slots. They have commutating poles and commutating, compensating, and exciting field windings which are arranged in series. A 12-pole design was chosen to obtain good commutation both at starting and at running speeds. The use of 12 poles provides a simple method of surmounting the commutation problem due to the transformer action of the exciting field, without using resistance leads or decreasing the total exciting pole flux when starting, when it is most needed. Two commutating field strengths are used on this motor, and good commutation is obtained at both low and high locomotive speeds.

Auxiliary Motors

Five six-pole auxiliary motors having the same design of armatures and stators are used for the two compressor motors, for the two traction motor blowers, and for the combined transformer-blower and battery-charging generator set. These auxiliaries, like the traction motors, have commutating, compensating and exciting windings. They likewise operate on both alternating and direct current. They have roller bearings which are grease lubricated.

The two compressors are of the two-stage type having one horizontal cylinder in each stage. Each compressor has a capacity of 100 cu. ft. of free air per minute. They are fitted with single-acting truck-type pistons. The cylinder bores, crank shaft, and bearings are all in the same cast-iron housing insuring positive and permanent alignment. All bearings are lubricated from the well formed in the compressor frame below the gear.

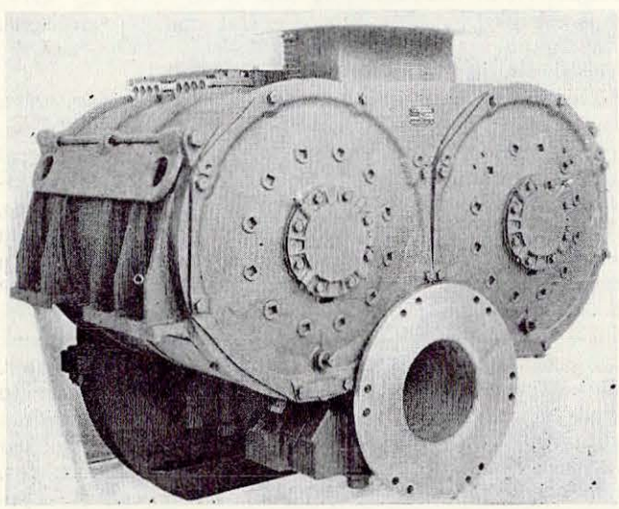
Control

The engineers position has been arranged to duplicate as far as possible conditions on previous New Haven locomotives and thus to minimize the difficulty in qualifying crews. The master controller differs from the usual type in that the change from series to series-parallel connection of the traction motors on direct current is accomplished in the "off" position of the controller by pressing a spring-returned button which operates the series-parallel switch. After the controller

(*Continued on page 449*)

List of Special Parts, Appliances and Equipment on the New Haven 2-C+C-2 Locomotives Built by the General Electric Company

Railroad	New Haven
Service	Passenger
Number built	Ten
Frames—Truck	General Steel Castings Corp.
Springs	Railway Steel-Spring Co.
Journal box lids	Symington Co.
Farlow draft attachments	Symington Co.
Radial couplers	Symington Co.
Wheel centers	Union Steel Casting Co.
Marker lights	Handlan-Buck Mfg. Co.
Window wipers	Dayton Mfg. Co.
Headlights	Electric Service Supplies Co.
Draft gear	W. H. Miner, Inc.
Paint	Dupont Co.
Engine truck wheels	Armco Railroad Sales Co.
Glass—Engineer windows	Triplex Safety Glass Co.
Foundation brake rigging	American Brake Shoe & Fdry Co.
Steam heat connection	Auto Tire Joints Co.
Hand brakes—"Peacock"	National Brake Co., Inc.
Oil burners, etc.	Peter Smith Heater Co.
Firebrick	McLeod & Henry Co.
Boilers—Heating	The Bigelow Co.
Boiler feed pump	Worthington Pump Co.
Turbo blowers for heating boilers	Pyle-National Co.
Oil gauges	King-Sealey Corp.
Train control cab signals	Union Switch & Signal Co.
Air brake	Westinghouse Air Brake Co.
Storage battery	Edison Storage Battery Co.
Flange oiler	Ohio Injector Co.
Bell ringer—Simplicity	American Locomotive Co.
Brake pins (Cooke)	American Rwy. Products Co.
Doors	Morton Mfg. Co.
Fire extinguishers	Phister Mfg. Co. & Lux by Walter Kidde Co.
Journal bearings	Magnus Co., Inc.
Sanders	Graham-White Sander Corp.
Steam pipe covering	Union-Asbestos & Rubber Co.



One of the Twin Motors Showing the Air Connection at the Top Which Displaces Canvas Ducts

W. H. Williams Succeeds Taussig as President of Wabash

Road greatly improved during eleven and one-half years of retiring executive's leadership

William H. Williams

James E. Taussig

JAMES E. TAUSSIG, president of the Wabash, has resigned effective September 10, to devote his time to personal affairs, although he will continue to serve the Wabash in an advisory capacity and remains on the board of directors of several companies in which the Wabash is interested. His retirement from active railroad service marks the close of a railroad career of 49 years, during which he rose from a clerk in the freight office to president of a 2,500-mile railroad, which position he has held for the past 11½ years. Mr. Taussig will be succeeded by William H. Williams, chairman of the Wabash board of directors and of its executive committee.

Mr. Taussig's railroad experience has been largely in the operating department and his wide experience has been reflected in a continual improvement in the operating results of the Wabash. Following his election as president in March, 1920, improvement immediately manifested itself, the net operating revenues increasing from $1,122,887 in 1920 to $8,711,523 in 1921 and to $20,357,551 in 1929, the banner year for the Wabash. The operating ratio has also shown a steady improvement, declining from 98.13 in 1920, and 85.29 in 1921 to 73.43 in 1929. In the same period, total operating revenues increased from $59,982,282 in 1920 to $76,632,924 in 1929; while net railway operating income rose from $5,491,512 in 1920 to $13,251,591 in 1929.

In 1920, the company moved more than 16,845,000 tons of freight; in 1929 it hauled more than 24,558,000 tons, while the number of tons of revenue freight carried one mile per mile of road gradually increased to 2,201,964 in 1928 and 2,419,932 in 1929. Tons per train were increased from 728 in 1920 to 1,709 in 1929, while car miles per day mounted to 45.5 in 1929.

During Mr. Taussig's presidency of the Wabash, this road has followed an active program of improvement, spending large amounts for road and equipment, $6,220,519 being expended for road and $4,618,826 for equipment in 1929, while in 1930 the company purchased 41 locomotives, a car ferry, a ditcher and some passenger equipment.

Mr. Taussig was born on May 4, 1865, at St. Louis, Mo., and was educated in private schools at London, England; Brussels, Belgium; and Darmstadt, Germany. He entered railway service in 1882 as a clerk in the freight office of the St. Louis Bridge & Tunnel Railroad at St. Louis, Mo. He held this position until 1885, when he became an agent for the Fort Scott, Wichita & Western, (now a part of the Missouri Pacific). In the following year he became chief clerk to the general manager of the New York, Providence & Boston (now a part of the New York, New Haven & Hartford). In 1887 he became chief clerk in the trainmaster's office of the Missouri Pacific at Wichita, Kan., and in 1888 was appointed chief train dispatcher for the Missouri Pacific at Winfield, Kan. He resigned from this position in 1891 to become agent for the Wheeling Bridge & Terminal Railroad (now a part of the Pennsylvania), at Wheeling, W. Va., and from May, 1892 to 1900, was superintendent of this railroad.

From May, 1900, to May, 1901, Mr. Taussig served as assistant to the general manager of the Wheeling & Lake Erie at Cleveland, Ohio, and from May, 1901, to December, 1904, was superintendent of telegraph of this road at Canton, Ohio. In December, 1904, he resigned to become superintendent of terminals of the Wabash at St. Louis, Mo., which position he held until 1911, when he was appointed superintendent of terminals of the Houston & Texas Central and the Galveston, Harrisburg & San Antonio (now part of the Southern Pacific) at Houston. In July, 1912, he was promoted to superintendent of the Houston division of the latter road at San Antonio, Tex., and in June, 1913, was made superintendent of transportation of the Texas & Pacific at Dallas, Tex. In May, 1914, he was promoted to superintendent of this road and in August, 1915, resigned to become assistant to the president of the Wabash at St. Louis, Mo. He held the latter posi-

tion until he was promoted to vice-president in charge of operation, which position he held until July, 1918, when he was made federal manager of this road and the Toledo, St. Louis & Western (now part of the New York, Chicago & St. Louis). Following the termination of federal control, he was elected president of the Wabash. At the time of his resignation, he was also president of the Lake Erie & Ft. Wayne, and the Ann Arbor, executive president of the Toledo & Western and vice-president of the Des Moines Union.

William H. Williams who succeeds Mr. Taussig has been chairman of the Wabash board of directors and executive committee since 1915 when a re-organization of the road was effected. In commenting upon his selection for these important posts, while he remained also vice-president of the Delaware & Hudson, the *Railway Age Gazette* of December 10, 1915, said "It is seldom that a man of 41—Mr. Williams was born in June, 1874—has the broad responsibilities and broad opportunities in railroad work which are here presented. He combines a quite varied experience in railroad affairs, as his service record shows, with an intimate knowledge of the financial problems which are often so little understood by railroad officers all of whose service has been on the road."

With such experience to draw upon it is evident why Mr. Williams, during the term of his service with the Wabash, has taken a more active part in the operation of the property than does the average railroad board chairman. He is therefore, as he assumes the presidency, in close touch with its operating and traffic problems as well as being intimately acquainted with the financial end of its business.

Mr. Williams was born June 25, 1874, at Athens, Ohio, and attended the Toledo, Ohio, public schools and the Beaver Valley Business College. He entered railway service as a cashier in the local freight station of the Pennsylvania Lines West at Toledo in May, 1890. The following year he became an assistant in the engineering corps of the Pittsburgh & Lake Erie, and in 1892 was employed as stenographer to the superintendent of telegraph on the Pennsylvania Lines West. A few months later he went into the office of Joseph Wood, who was then general manager of the Pennsylvania Lines West, working as stenographer for Mr. Wood until January, 1896. In that year L. F. Loree was made general manager of the Lines West and Mr. Wood became third vice-president. Mr. Williams became Mr. Loree's secretary, and also chief clerk to Mr. Wood.

When Mr. Loree became president of the Baltimore & Ohio, Mr. Williams was made assistant secretary of that company and acted also as assistant to the general manager. Mr. Loree went to the Rock Island in 1904, and Mr. Williams from April to October of that year was superintendent of freight transportation, yard and station service on the St. Louis & San Francisco, (now St. Louis-San Francisco), which was then under the same management as the Rock Island. For the two years 1905-1907 Mr. Williams was statistician for the General Managers' Association and also traffic manager of the Merchants' & Manufacturers' Association and the Chamber of Commerce of Pittsburgh. Mr. Loree became president of the Delaware & Hudson in 1907, and offered Mr. Williams a position as his assistant, which offer was accepted, and a few months later Mr. Williams was made third vice-president. In 1915, he was promoted to vice-president of that road, from which position he resigned in 1928, to devote his entire time to the Wabash, with which road he has served in the capacity of chairman of the board and of the executive committee since 1915. Mr. Williams was also chairman of the board of the Missouri Pacific and several of its subsidiaries from 1924 to May, 1930, when he relinquished his Missouri Pacific connections.

Freight Car Loading

WASHINGTON, D. C

REVENUE freight car loading in the week ended September 5 amounted to 759,546 cars, a decrease of 4,218 cars as compared with the previous week. As compared with the previous week of last year this was a decrease of 97,103 cars and as compared with 1929 the decrease was 258,935, but the comparisons are disturbed by the fact that the Labor Day holiday was included in the corresponding weeks of the last two years while this year it did not come until September 7. Loading of l.c.l. merchandise freight, showed an increase of 6,942 cars as compared with last year, and loading of coke, ore and merchandise showed increases as compared with the week before.

Whereas in 1930 the peak loading for the year occurred in the last week of August, when it amounted to 984,510 cars, that period has been passed this year without exceeding the loading for the week ended May 2, the highest so far this year, when 775,291 cars were loaded. The summary for the week ended September 5, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, September 5, 1931

Districts	1931	1930	1929
Eastern	171,859	181,464	218,516
Allegheny	150,505	167,089	212,684
Pocahontas	49,068	52,031	60,245
Southern	104,210	118,536	142,120
Northwestern	111,457	137,351	159,825
Central Western	113,976	128,941	142,877
Southwestern	58,471	71,237	82,214
Total Western Districts	283,904	337,529	384,916
Total All Roads	759,546	856,649	1,018,481
Commodities			
Grain and Grain Products	38,224	50,056	45,750
Live Stock	22,531	24,691	27,277
Coal	132,955	138,138	159,719
Coke	5,172	8,537	11,847
Forest Products	27,975	37,109	60,668
Ore	35,157	47,451	67,186
Merchandise L.C.L.	218,231	211,289	234,624
Miscellaneous	279,301	339,378	411,410
September 5	759,546	856,649	1,018,481
August 29	763,764	984,510	1,162,100
August 22	748,711	940,558	1,137,966
August 15	742,736	922,823	1,102,567
August 8	734,780	904,157	1,092,153
Cumulative total, 36 weeks	26,417,581	32,284,664	36,396,218

The freight car surplus for the week ended August 31 averaged 573,680 cars, an increase of 428 cars as compared with the week before. The total included 302,887 box cars, 206,240 coal cars, 24,850 stock cars and 15,010 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended September 12 totaled 53,171 cars, an increase over the previous week of 4,160 cars, but a decrease of 16,986 cars from the same week last year.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
Sept. 5, 1931	53,171	23,626
Aug. 29, 1931	49,011	22,562
Aug. 22, 1931	47,493	21,599
Sept. 6, 1930	70,157	29,355
Cumulative Totals for Canada		
Sept. 5, 1931	1,731,955	943,292
Sept. 6, 1930	2,157,319	1,212,091
Sept. 7, 1929	2,407,875	1,487,410

Hearings on Railroad Practices

Initial testimony in Ex Parte 104 given at Boston by Bangor & Aroostook and Boston & Albany witnesses

HEARINGS in connection with the Interstate Commerce Commission's investigation of "certain railway practices" (Ex Parte 104) got under way at Boston, Mass., on September 15 with the taking of testimony, under Part 2 of the investigation, with reference to accessorial services provided by the New England roads. Initial testimony, relating in general to deliveries of carload freight to industrial sidings, was taken from operating and traffic witnesses; the former described the physical characteristics of the sidings under discussion and the switching movements involved in each case, while the traffic witnesses explained the tariff arrangements covering such services.

W. P. Bartel, director of the Interstate Commerce Commission's Bureau of Service, presided at the session. He was assisted in the examination of carrier witnesses by Attorney A. G. Hagerty and Examiner C. W. Bardwell.

The Bangor & Aroostook, the first railroad to be heard, called three witnesses—W. B. Hill, general freight agent; G. H. Brimmer, chief of tariff bureau, and W. K. Hallett, general manager. The presentation was under the direction of Henry J. Hart, general counsel.

No Private Sidings on Bangor & Aroostook

It was brought out in the course of the evidence presented by the Bangor & Aroostook that that road is unique in that it has no so-called private industrial sidings along its lines; all sidetracks are owned by the railroad and located on its right-of-way. Thus, in lieu of private siding delivery, certain Bangor & Aroostook patrons receive what was designated by the witnesses as "special sidetrack services."

Mr. Hill first presented a series of exhibits listing Bangor & Aroostook shippers who enjoy these special sidetrack services; another series consisted of tariffs covering, in addition to line-haul tariffs, such accessorial services as are not included in the line haul rates.

Mr. Hallett, following Mr. Hill, opened with a statement revealing that the principal commodities handled by the Bangor & Aroostook are: Potatoes, pulp wood, bituminous coal, newsprint, fertilizer and lumber, L.C.L., he said, constitutes but 2.1 per cent of the road's tonnage. The bulk of all tonnage is originating traffic.

Potato Shipping Facilities

In his explanation of the switching services, Mr. Hallett turned first to the facilities of the potato shippers. These in general have warehouses located on land leased to them by the Bangor & Aroostook although there are exceptions where the shipper owns his warehouse site. In all cases, however, the railroad holds title to the sidetrack serving the warehouses—it requires a deeding of such right-of-way to the railroad before any siding is built. Also in all cases, the railroad is relieved of any liability from fire which might attend its locomotives' work of switching to these warehouses. This latter provision is written into the lease where the railroad owns the warehouse site or into the sidetrack agreement when the shipper owns the land. The railroad pays the taxes on the land which it leases to potato shippers and charges a uniform rental to all of $10 per year for each 40 ft. of track frontage. Tracks serving these warehouses, Mr. Hallett explained, are considered by the railroad to be available for its use either for storage or to serve other shippers, although the shippers located adjacent to the sidings enjoy "preferential use." He stated that there had never been any difficulty in connection with this plan.

Lessees of Railroad Land Must Ship By Rail

In the cross-examination of Mr. Hallett it was revealed that the leases whereby the potato shippers obtain from the Bangor & Aroostook their warehouse sites provide that such warehouses shall be used only for the storage of commodities received or shipped over the Bangor & Aroostook. The witness replied in the negative when asked by Director Bartel if he was aware that such a provision was contrary to the view of the Interstate Commerce Commission as expressed in its investigation of leases of carrier property. He reiterated the negative reply when asked by Johnston B. Campbell, former Interstate Commerce Commissioner, representing the Boston Port Authority, if he knew that the I.C.C. had gone farther and required cancellations of such leases.

Following his general outline of the facilities afforded potato shippers, Mr. Hallett was asked about the relations of the Bangor & Aroostook with the Monson Railroad a narrow-gage line running between Monson Junction, Me., and Monson. He stated that lading is transferred from Monson to Bangor & Aroostook cars at the expense of the former on carload traffic; l.c.l. freight received from the Monson is handled through the Bangor & Aroostook freight house just as though it had been delivered there by truck. Mr. Brimmer here testified that the Bangor & Aroostook has no through rates with the Monson; the latter, he said, publishes its own rates which are arbitraries or proportions, no part of which are absorbed by the Bangor & Aroostook.

Bangor & Aroostook Tidewater Facilities

Resuming his testimony, Mr. Hallett described the tidewater facilities of the Bangor & Aroostook at Searsport, Me. The coal handling facilities at this point are operated by the Penobscott Coal & Wharf Company and are located on land leased from the Bangor Investment Company, a subsidiary of the Bangor & Aroostook. The railroad is not, however, interested either directly or indirectly in the Penobscott Coal & Wharf Company. All coal moving through Searsport is handled over the Penobscott facilities and the railroad pays the regular tariff rate to the Penobscott for the handling of its company coal received at tidewater, although it does not buy the coal from the Penobscott. The latter under the Maine laws is a public utility and publishes regular tariffs.

Like those in the potato country, the tracks serving the Searsport facilities are owned by the railroad and used for general railroad purposes. The railroad also maintains a warehouse at Searsport which is used main-

ly for the storage of inbound commodities, i.e., before they have been received by the Bangor & Aroostook in its capacity as a common carrier. The warehouse charges are published, however, to cover instances where the storage is incidental to common carrier transportation service. Loading and unloading services at Searsport are provided by the Bangor Investment Company at a uniform charge to all.

Mr. Hallett next explained in detail the switching movements performed and the cost thereof at certain points selected as being typical of the entire railroad. Much of this testimony related to potato handling and he explained that all potato shippers are located adjacent to the tracks and thus they all get the same service. The switching costs per car, including both placement and removal, as shown in the exhibits, ranged from about $1.60 to $2.

Paper Mill Facilities

The witness was then questioned at length regarding the facilities afforded the Great Northern Paper Company at Millinocket, Me. The Bangor & Aroostook yard at Millinocket is located some distance from the Great Northern mill which is served by the Millinocket mill spur. The railroad owns all the tracks serving this paper mill and performs all switching services to the various sidings involved. Line-haul rates, Mr. Hallett testified, were originally made in the light of the service to be rendered. If the mill is unable to accept delivery of cars a constructive placement is made—no charge is made for subsequent actual placement as, it was explained, constructive placement usually means leaving the car in the Millinocket yard with no extra handling. This plan is in effect at all points, while the Great Northern Paper Company, like other shippers with special sidetrack services, releases the railroad from liability for fire. If, after actual placement of cars is effected, the paper company asks a new placement, a switching charge is made.

Bangor & Aroostook Traffic Peculiar

In summing up testimony, Mr. Hallett stated that the Bangor & Aroostook traffic is peculiar in that it is confined, in the main, to industries where special sidetrack facilities are needed. His remaining direct testimony related to l.c.l. traffic which, he explained, is sometimes switched in a car to a siding where it is unloaded by the consignee. Tariffs providing for such handling were among the exhibits.

Mr. Hallett in closing suggested that a charge should be made on cars held for billing—a practice which he said had recently developed to cause much extra switching. Under cross-examination he emphasized the fact that the Bangor & Aroostook does no loading, unloading or storage of carload freight.

The chief of the tariff bureau, Mr. Brimmer, who followed Mr. Hallett, explained such Bangor & Aroostook tariffs as provide for allowances or absorptions. Most of these, he said, are obsolete, while the others are seldom used. The road has no reconsignment tariffs although it does occasionally absorb diversion charges on certain competitive traffic.

Boston & Albany Opening Testimony

Testimony on behalf of the Boston & Albany opened late in the September 15 session. Frederick F. Williams, trainmaster at Boston, explained the switching services given certain plants in the Boston area, while Richard Van Ummerson, freight traffic manager, discussed the tariffs and charges relating thereto. The service afforded the New England Fuel & Transportation Company was first explained. This is a large plant with track and locomotive facilities of its own, its tracks also serving other plants not accessible to the B. & A. over its own rails. The B. & A. effects industrial siding delivery to the New England by bringing trainloads onto certain designated tracks of the plant's rail system. The plant then spots the cars itself and in addition spots cars to other plants on its tracks. The same situation obtains with reference to the Merrimac Chemical Company, although there are no other plants on the Merrimac tracks.

The Boston & Albany continued its presentation at the morning session of September 16, with brief testimony from several trainmasters who have jurisdiction over other industrial switching operations about which the I. C. C. in its notice to the railroad had specifically inquired. These were in the main similar to the B. & A. operations at the plant of the New England Fuel & Transportation Company, involving the leaving or receiving of cars on designated tracks while the industry does its own spotting. In summarizing these situations Attorney Hagerty brought out that the limit of the service within these plants is fixed by the industry and that the B. & A. would, if required, spot the cars within the plant without any additional charge over the line haul rates.

Cross-examination of Freight Traffic Manager Van Ummerson concluded the B. & A. evidence. Director Bartel was interested in the spotting of cars for other plants on its rails which is done by the New England Fuel & Transportation Company. The witness explained that under several sidetrack agreements more than one plant is served and added that if the New England refused to serve the plants on its tracks the B. & A. could not give service to those plants. In none of these cases are allowances made—the B. & A. effects delivery when it places the cars on the designated tracks. If there is congestion on the designated tracks constructive placement is effected and demurrage is computed from the time of such constructive placement.

Asked why, if it would under the line haul rates make placements within plants now doing their own spotting, the B. & A. does not make an allowance to those plants, Mr. Van Ummerson stated that no allowance is made because the B. & A. is ready and willing to make delivery on any track designated.

As to the Grafton & Upton Railroad, Mr. Van Ummerson said that the B. & A. maintains joint rates and regular interchange with this line which is now electrically operated. When it was suggested that the Grafton & Upton is classified as a street railway, the witness retorted that it was so classified by the United States government because it is given street railway mail pay instead of steam railway rates.

Mr. Van Ummerson concluded with a general resume of the situation on the Boston & Albany with regard to accessorial services, absorptions, etc. Rates, he said, are in effect to and from connecting carriers involving an absorption by the B. & A. of the connecting line's switching charge. He explained the exceptions to the general rule that requires railway patrons to load and unload carload freight. In accordance with the general practice import and export freight is loaded and unloaded at Boston. A charge of 60 cents a ton is, however, imposed for the loading and unloading of import or export freight on which the B. & A. does not get a line haul. Loading services are also available, at a charge, for such carload shippers as wish to use them at Boston and East Cambridge. In no case, however, is there any allowance for this service—it is all done by Boston & Albany employees.

Closing testimony of Mr. Van Ummerson related to warehouse facilities provided by the B. & A. at Boston and charges and services in connection therewith.

Boston & Maine

J. R. MacAnanny, assistant freight traffic manager, was the first Boston & Maine witness. He opened with a general statement outlining tariff provisions for accessorial services performed by the B. & M. Connecting line switching charges are absorbed but no allowances are made except to the Berlin Mills Railway, a plant railroad of the Brown Company at Berlin, N. H., which is operated as a common carrier. B. & M. tariffs covering ferry car service reserve to the railroad the right to perform trucking in lieu of such switching service; in no case however is the ferry car service extended by truck to plants without sidetrack facilities. In response to Director Bartel, Mr. MacAnanny stated that generally speaking ferry car service is compensatory—line haul rates are sufficient to permit absorption of the switching costs. The general B. & M. switching tariffs provide a charge of 40 cents a ton for switching outside of Boston and $10 a car at Boston when there is no line haul for the B. & M. involved.

Boston Waterfront Services

Waterfront services of the Boston & Maine at Boston are provided through a subsidiary, the Mystic Terminal Company, and were described by Frank W. Rourke, superintendent of the latter. Mr. Rourke explained that the B. & M. pays the terminal company 60 cents a ton for loading and unloading freight moving over Mystic wharf. The only storage facilities at the Mystic Terminal are on the piers or on adjacent land where coal is stored. The Mystic Terminal Company makes to stevedoring companies an allowance of 25 cents a ton on steel moving from ship to rail in order to assure that it is properly stowed in cars. This allowance comes out of 60 cents which the Mystic Terminal receives from the B. & M. and is regarded as more economical than would be a performance of the stowing itself.

When coal is received for storage in lots at Mystic Terminal the same rate is charged for its discharge from the vessel as though it were moving away in cars; an additional six cents a ton is charged for its transfer into storage and a like amount for its subsequent removal and loading if it moves away in cars, 15 cents a ton if the coal moves away in trucks.

At this point F. L. Sears, manager of the B. & M. bureau of statistics, introduced an exhibit showing a composite figure of B. & M. switching costs per locomotive hour for three different classes of switchers in general use. The figure was the average cost at 15 selected yards and varied according to the locomotive type from $8.55 to $10.16. Elements in the computation, Mr. Sears explained, were in the main out-of-pocket costs.

Industrial Switching Services

There followed a series of B. & M. operating department witnesses who outlined the operations and time involved in serving tracks of certain specified plants. The New England Fuel & Transportation Company, referred to in the Boston & Albany testimony as the plant which in addition to doing its own spotting also spots cars for other plants on its tracks, was one of these.

A Novel Situation

At this point counsel for the New England Fuel & Transportation Company explained that that firm makes charges for such switching services as it performs for others. He continued to say that the situation, which Director Bartel called "at least novel," is not a satisfactory one either to his client or to the industries which pay the New England for services without any compensating allowance from the railroads.

With the testimony of its operating department witnesses the B. & M. closed but later agreed to recall some of its witnesses to explain operations in which Attorney Hagerty was interested.

The traffic manager of the Berlin Mills Railway next explained that road's operations; it serves the Brown Company plants, a couple of other industries and is a medium for interchange of traffic between the B. & M. and Canadian National. It publishes only a switching charge which is absorbed to some extent by its connections.

Day Baker, legislative counsel for the Motor Truck Club of Massachusetts, Inc., read a preliminary outline of proposed evidence on the extent to which the B. & M. absorbs the losses of its subsidiary, the Boston & Maine Transportation Company. Director Bartel reserved decision as to whether or not more detailed evidence on this matter was pertinent to the inquiry.)

Central Vermont

The Central Vermont presented the testimony of its assistant general freight agent, J. L. Dempsey, and Division Superintendent E. J. Guthrie. This road accepted for itself the opening statement made for the B. & M. by Mr. MacAnanny with the exception that its general switching rate is 38 cents a ton instead of 40 cents. Freight service conductors actually performing the operations under discussion followed Mr. Guthrie on the stand to explain specific switching moves required. The Central Vermont makes no allowances for switching services nor does it handle any export or import traffic through New London, Conn.

New Haven Receives Ten Electric Locomotives

(Continued from page 444)

is notched up to the series, running connection, it is returned to the "off" position, the series parallel button is pushed and the controller moved again through the same series of notches.

The locomotives are arranged for double-end operation and can be operated in multiple in the a.c zone. A dead-man feature is included on the controller handle which gives a full brake application when released. Provision is made for cab signals with apparatus of the Coder type, power for which is supplied at 32 volts.

A Thyrite lightning arrester, and an oil circuit breaker with 100,000 kv.a. rupturing capacity has been provided ahead of the main transformer. The primary of the transformer is protected by a differential connection against faults to ground and has straight overload protection in addition. This combined protection is proved in a differential-overload relay.

A two-winding air-blast transformer is used. This was specially designed to go lengthwise between the truss members of the cab, and to carry the preventive coils in a convenient location on top.

A hand-thrown change-over switch for the traction motor circuits is used as on previous locomotives for a.c. and d.c. service. The main motor circuit breaker is a standard high-speed air breaker and is operative

both on a.c. and d.c. This is the first application of a high-speed breaker to a.c. locomotives. Necessary relays are provided for slip and voltage differential protection for the traction motors, current differential and overload protection for the motors, current differential and overload protection for the transformer; for the protection of auxiliary apparatus on d.c., a hand-operated circuit breaker is provided.

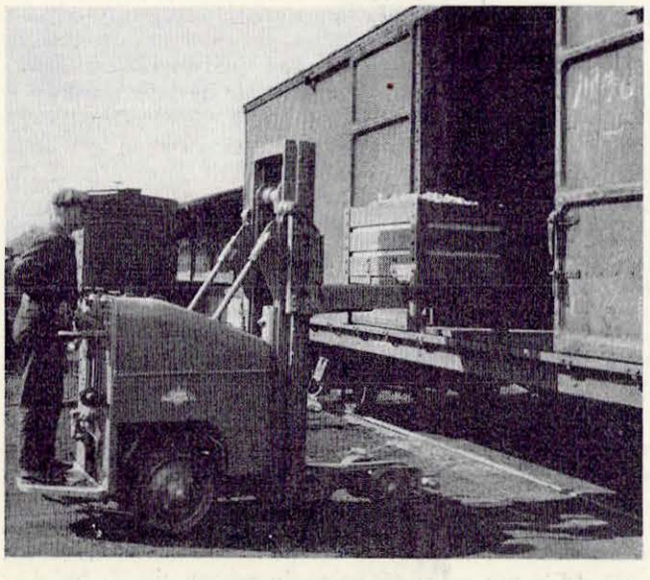
The resistors used in the traction motor circuit for d.c. operation are of cast iron, designed for minimum weights consistent with ample rating in connection with frequency of stops and starts which may be necessary due to signal failures, and are forced ventilated from the traction motor duct. Individual electro-pneumatic contactors are used in circuits carrying over 1,000 amperes.

A Gas-Powered Lifting Truck

A TIERING truck that steers with all four wheels and is powered with a tractor-type gas engine capable of 24 hours of continuous operation has been developed by the Clark Tructractor Company, Battle Creek, Mich. The method by which all four wheels turn in response to the steering control enables the truck to get into tight places with its load and get away easily. The turning radius of 94 in. enables the truck to negotiate the corner of two intersecting 64-in. aisles with ease.

The hydraulic lift applies power without a drum and cushions the descending load. Materials and equipment on skid platforms or in tote boxes are quickly moved from place to place and stacked in tiers by the new truck which will tier a three-ton load to six ft. in 30 sec.

Because of its low overall height, the truck is also adapted to loading and unloading freight cars. It can take the load to the far end of the car and spot it without waste movement. Its flexibility and construction permits the driver to see clearly at all times.



A New Lift Truck

Odds and Ends . . .

Lackawanna Kills Deer Out of Season

While feeling its way through a thick fog near Gillette, N. J., 28 miles west of New York, at 6:34 a.m. on August 25, an electric suburban train on the Delaware, Lackawanna & Western struck and killed a buck, one of four wild deer which were standing on the track. In accordance with the New Jersey law, the Lackawanna promptly reported the killing of the buck to the state game warden. We have been unable to learn whether venison was served the next day in the dining cars.

Who Used the First Copy Press?

SAN FRANCISCO, CAL.

TO THE EDITOR:

In a clean-up campaign on the Pacific System of the Southern Pacific, about 750 old copy presses were turned into the stores department for disposition, principally from offices of station agents. Many of these had been in use since the offices were first opened to traffic back in the '60's and '70's. The general use of carbon paper for making copies of correspondence and reports made the copy press method obsolete. The discarding of the presses made it possible to effect a substantial saving in copying ink, pencils and ribbons, tissue impression books, copying rags, clothes wringers, etc., and also released valuable space for other uses.

It would be interesting to know who invented the copy press method and when it was first used. It was undoubtedly considered an important invention and justly so as it was used throughout the civilized world for a century or more. Prior to the discovery of the copy press, it was necessary to make copies of letters and documents by rewriting in manuscript.

Many of the older employees gave up their presses reluctantly. They had been fixtures in the offices for 50 years or more, and had become almost as much a part of the offices as the employees themselves. The younger generation did not take to copy presses, however, preferring the quicker and cleaner carbon-copy method. As a consequence, the making of legible tissue impression copies was becoming a lost art. Many of the old timers, however, were really artists at making copies with the presses. They knew exactly how much moisture the rags should contain, how many turns of the handle were necessary to bring about the required pressure, and the time almost to the second that the books should remain in the press. Several of the older agents became very much attached to the presses and sincerely believed that they were the best method of making copies. In fact, some of them put up such a strong argument that they were permitted to retain them.

Some of the agents found uses for the presses other than for making impression copies. The wife of one agent used a press to do her weekly ironing. She placed napkins, handkerchiefs, towels, and other such articles in the press after folding and carefully smoothing them out by hand. The press was then screwed down tightly. When the laundry was removed from the press an hour or so later, it was almost as smooth and free from wrinkles as if the work had been done by an electric iron.

Some of the agents who were not furnished with safes used the copy press for protection of records against fire. Before leaving the office at night, they would put the cash book and other valuable current records into the copy press and then screw it down tightly. They knew that the press would afford protection against fire because a book tightly pressed, especially in an iron press, would burn with great difficulty. Some of the agents used them for pressing records before binding.

When it was decided to release the presses, the agents found a market for some of them by selling them to individuals for making prints of etchings, block printing, pressing botanical specimens, book binding, fruit presses, etc. The California State Department of Education published a notice of the surplus of copy presses in its official monthly publication, "California Schools." This resulted in the sale of a number of the presses for use in public schools.

C. C. MALLOY,

Supervisor, Office Equipment and Methods, Southern Pacific.

NEWS

More Money for Rails and Less for Taxes

Rate advance rather than increased public building key to recovery, C. V. treasurer states

The argument for an advance in railway rates to protect railway credit and enable the carriers to maintain their properties and service and at the same time increase employment "is much stronger than the argument for huge expenditures of taxes upon public works to give increased employment," J. B. Wood, treasurer of the Central Vermont, held in a recent address before the Montpelier (Vt.) Rotary Club.

Stressing the part the American railways play in the economic life of the United States, Mr. Wood said it was questionable as to whether "some or most of the public works upon which billions of dollars are being spent this year with a corresponding effect on taxes, are needed by the public; but there is no question whatever as to the need of the public for good railway service, or as to the need of the railways for an increase in their revenue to enable them to maintain such service."

"How can anybody who believes it is in the public interest to increase taxes to enable the state and national governments to give more employment, believe it would not be in the public interest to increase railway rates and revenues to enable the railways and manufacturers to give more employment?" Mr. Wood asked.

The railways have never received their share of prosperity Mr. Wood continued, and, owing to actions by legislative bodies, have been denied the business advantages enjoyed by other industrial enterprises.

If the rail carriers were permitted to participate in periods of prosperity to the same extent as other business, they should naturally be expected to sacrifice in periods of adversity, the speaker asserted, adding that it must be borne in mind that even in times of prosperity the returns on railway capital have been inadequate; the average return on railroad property investments during the past 10 years being slightly above four per cent.

Indiana Railroad Inspector

Charles Michaels, of Logansport, Ind., has been named chief railroad inspector of the Indiana Public Service Commission. He succeeds William P. Holmes, who died on August 21, at his home in Indianapolis, Ind.

"Only a week ago I was trapped behind a huge van with three trailers and was unable to pass them for several miles. Every motorist, going in either direction, was in danger of a head-on collision if they tried to pass. The earth fairly shook under the roll of the huge vehicle. And what brought anathema to my tongue was the fact that the 'freight train' bore an Ohio license plate. A woman in a nearby village writes that she counted one 'train' which had six trailers attached. That's a whopper and I wonder if her count was accurate.

"However, for whom are the highways paved? Is New York State building these arteries for trucking companies of other states who endanger our own motorists? A railroad is compelled by law to own its own right-of-way, to maintain it in perfect condition, to provide danger signals and flagmen at crossings, to whistle at every cross road, to man every train with so many men, including engineer, fireman, conductor, flagman and trainmen and to throw every safeguard around the public. A trucking van as long as some locomotives with trailers attached, seldom has more than two men, sometimes only one, pays nothing for maintenance of way, usurps the right-of-way of the public and throws no safeguard around the public. It should be remedied, or stopped."

—Jack Burgess' Column in the Rochester (N. Y.) Times-Union.

Family Bargain Fares

Railroads in the Southwestern Passenger Association Territory are offering family bargain fares from points on their lines to points in Texas on September 25 and 26 and good returning until October 6. The rates are designed to induce the "taking of the family along at little additional cost." The rates are fixed on a sliding scale, so that the round-trip rate per person varies with the number of persons transported. For example, the regular round-trip adult fare from St. Louis to Dallas is $48.06, while under the new rates, one adult ticket costs $26, two adults on one ticket $41.60; five adults on one ticket $55. Using the round-trip rate of $55 for five adults, the rate per person between St. Louis and Dallas, 767 miles each way, amounts to between 7 and 8 mills per mile.

I. C. C. Receives Many Briefs in Rate Case

Suggestions for "arbitrary increase" and "emergency surcharge" are included

The first of the flood of briefs to be filed with the Interstate Commerce Commission in Ex Parte No. 103, on the application of the railroads for a general increase in freight rates, began arriving early this week. All were to be in by September 18 and the oral argument before the full commission begins on September 21. The commission made public a list of over 600 parties who had filed appearances in the case, asking each one to give notice as to what briefs of the others he desired to receive.

The first brief to be made public by the commission was that of T. D. Geoghegan, of Washington, D. C., on behalf of West Virginia livestock growers and shippers, who suggested a plan for a temporary emergency surcharge on all railroad freight bills, with possibly some exceptions, to be kept separate from any freight rate structure or tariffs, and to be pooled and distributed to the railroads in proportion to their needs, under the supervision of the commission, as an alternative to the 15 per cent increase proposed by the roads. No explanation was offered as to why it should be handled by the commission instead of by the Red Cross. While opposed to any increase in rates, Mr. Geoghegan said that these shippers recognize that their views cannot control in a country-wide proceeding of this character and that the plan was submitted, "realizing that the commission might find it necessary, based upon all of the evidence, to grant some increase." He said the railroads had emphasized the emergency nature of their application, "indicating their belief that present conditions are temporary," and he asked that any relief granted by the commission bear a definite expiration date. He proposed that the surcharge be covered by a single uniform tariff and be shown separately on freight bills, and that while it might be made as a percentage, by fixed amounts per car, per 100 pounds or per ton, a percentage applicable to the total charges on the shipment would be preferable. According to Mr. Geoghegan it is common knowledge that the carriers intend to cut certain rates as soon as the increase takes effect, thus throwing wide open the doors to "endless discrimination and preference" and that an emergency relief measure should not be allowed to

(Continued on page 454)

Operating Statistics of Large Steam Railways—Selected Items for the Month of July, 1931

Region, road and year	Average miles of road operated	Locomotive-miles: Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross. Excluding locomotives and tenders	Ton-miles (thousands): Net. Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany	1931 402	137,313	143,742	11,842	3,824	65.8	198,553	66,014	86	44	33.8	32
	1930 407	149,602	158,663	15,769	4,216	64.0	225,789	79,380	90	32	26.1	39
Boston & Maine	1931 2,066	305,424	346,550	33,518	9,968	68.4	512,335	184,491	193	98	33.6	26
	1930 2,066	334,579	381,536	52,963	10,887	69.3	567,245	217,009	237	55	18.8	55
N. Y., New H. & Hart.	1931 2,069	446,892	523,125	30,322	13,935	63.0	762,301	274,738	246	98	28.5	22
	1930 2,104	435,385	501,562	28,687	14,197	62.6	792,957	298,097	272	70	20.5	38
Great Lakes Region:												
Delaware & Hudson	1931 876	245,070	316,036	33,996	7,576	60.1	473,029	210,115	240	30	11.2	124
	1930 875	280,298	364,639	38,713	8,723	61.4	540,748	244,423	242	32	11.6	120
Del., Lack. & Western	1931 998	378,836	422,947	47,888	12,284	66.2	694,196	272,505	212	58	21.5	43
	1930 998	424,522	469,425	53,062	14,120	65.8	813,205	332,087	235	57	19.4	42
Erie (inc. Chi. & Erie)	1931 2,316	733,023	762,933	55,896	31,689	59.4	1,958,393	687,798	388	104	21.2	111
	1930 2,316	796,022	851,671	60,501	34,506	60.7	2,123,242	806,979	396	85	17.6	90
Grand Trunk Western	1931 1,022	219,485	221,708	2,033	5,468	57.7	331,181	111,443	116	36	23.7	39
	1930 1,020	230,383	233,666	3,915	6,457	62.2	373,645	132,447	117	34	22.5	37
Lehigh Valley	1931 1,343	415,375	436,795	39,071	12,145	63.1	737,731	299,850	219	144	39.8	49
	1930 1,343	456,315	490,534	46,431	14,285	63.7	894,512	392,690	249	92	26.9	45
Michigan Central	1931 1,869	389,011	389,916	9,403	11,981	58.8	702,480	224,612	151	62	29.0	54
	1930 1,865	416,068	418,263	12,721	13,429	58.6	802,736	270,031	163	52	24.2	53
New York Central	1931 6,477	1,617,120	1,743,438	101,019	59,089	60.8	3,649,395	1,477,598	850	521	38.0	265
	1930 6,468	1,717,281	1,856,411	135,782	64,959	60.6	4,047,642	1,696,778	1,036	324	23.8	409
New York, Chi. & St. L.	1931 1,660	467,257	483,933	2,521	14,905	60.3	874,535	301,316	177	68	27.8	64
	1930 1,660	528,673	540,632	6,734	16,884	60.3	994,842	357,057	198	61	23.6	56
Pere Marquette	1931 2,201	317,001	321,139	3,957	7,260	59.6	455,341	176,737	146	30	17.0	39
	1930 2,201	383,089	387,940	3,625	9,485	59.3	586,742	224,932	168	21	11.3	40
Pitts. & Lake Erie	1931 235	80,232	81,681	1,047	3,003	59.7	251,296	143,479	58	20	25.6	31
	1930 232	117,240	117,697	1,307	4,584	62.9	372,710	217,652	58	13	18.2	26
Wabash	1931 2,497	679,399	718,119	13,000	20,109	60.7	1,201,461	393,451	285	133	31.8	61
	1930 2,497	659,240	706,938	10,460	21,070	61.8	1,253,498	451,466	293	83	22.0	62
Central Eastern Region:												
Baltimore & Ohio	1931 5,536	1,343,284	1,533,495	174,661	41,221	59.7	2,757,008	1,184,370	899	271	23.2	284
	1930 5,541	1,522,490	1,750,196	214,916	48,974	60.4	3,329,817	1,505,817	988	201	16.9	246
Big Four Lines	1931 2,721	618,635	640,329	18,821	18,429	59.4	1,176,875	510,334	282	153	35.2	52
	1930 2,712	718,330	741,345	16,646	21,350	61.0	1,370,769	615,468	299	160	34.9	44
Central of New Jersey	1931 692	183,758	198,380	29,857	5,124	56.0	344,055	147,211	138	46	25.1	56
	1930 692	245,126	265,998	38,515	6,832	57.0	466,923	211,866	160	32	16.8	26
Chicago & Eastern Ill.	1931 939	182,335	182,458	2,444	4,382	58.5	271,931	103,680	91	69	43.2	42
	1930 946	202,576	203,534	2,617	5,638	64.0	332,947	137,584	102	52	33.7	43
Elgin, Joliet & Eastern	1931 447	88,493	91,320	2,246	2,094	58.3	163,957	79,869	82	9	10.4	22
	1930 453	114,281	122,168	4,748	3,044	61.8	232,841	119,650	84	11	11.5	14
Long Island	1931 400	43,848	46,299	12,125	453	51.9	33,671	13,214	44	4	8.3	4
	1930 400	41,956	44,925	10,971	462	51.2	34,643	13,224	40	8	16.7	2
Pennsylvania System	1931 10,628	3,233,288	3,635,119	363,070	111,070	61.7	7,325,035	3,146,228	2,252	274	10.8	860
	1930 10,675	3,512,058	3,975,597	394,507	125,780	61.9	8,427,695	3,746,296	2,447	282	10.3	747
Reading	1931 1,451	477,068	516,940	46,758	12,748	57.6	929,615	424,959	315	73	18.8	80
	1930 1,448	564,513	612,153	49,971	15,306	57.6	1,110,319	531,313	317	63	16.5	60
Pocahontas Region:												
Chesapeake & Ohio	1931 3,110	972,351	1,018,373	35,230	38,108	54.6	3,268,703	1,757,203	660	69	9.4	316
	1930 3,086	1,096,783	1,161,086	48,753	40,372	55.7	3,349,895	1,799,349	524	111	17.5	100
Norfolk & Western	1931 2,272	687,580	733,642	30,671	24,439	57.4	2,051,107	1,062,740	451	37	7.6	147
	1930 2,230	751,811	824,997	38,867	27,897	57.7	2,344,941	1,227,106	458	46	9.1	139
Southern Region:												
Atlantic Coast Line	1931 5,163	585,918	590,831	8,421	11,808	58.7	660,374	220,721	395	82	17.3	86
	1930 5,157	555,368	557,147	8,462	12,913	58.1	740,664	256,728	375	68	15.4	105
Central of Georgia	1931 1,900	295,896	297,344	6,599	6,446	63.3	358,875	120,969	112	33	22.5	...
	1930 1,900	281,002	284,116	4,748	6,504	65.5	352,455	128,007	128	22	15.0	3
Ill. Cent. (inc. Y. & M. V.)	1931 6,670	1,533,612	1,544,664	25,066	35,399	59.0	2,359,450	887,057	718	191	21.0	41
	1930 6,695	1,585,102	1,600,995	28,704	40,793	60.0	2,695,780	1,070,933	734	125	14.6	82
Louisville & Nashville	1931 5,263	1,174,620	1,246,641	32,955	25,491	58.1	1,751,984	796,946	521	180	25.7	128
	1930 5,251	1,367,021	1,444,858	40,501	29,878	58.4	2,049,924	944,607	574	128	18.2	125
Seaboard Air Line	1931 4,466	512,298	523,388	5,057	11,669	59.3	681,166	239,589	255	28	9.9	37
	1930 4,479	518,970	541,261	4,797	12,191	60.6	704,501	253,983	275	28	9.2	20
Southern	1931 6,675	1,269,240	1,283,407	23,092	30,466	63.5	1,661,955	600,357	803	169	17.4	217
	1930 6,676	1,342,919	1,368,384	23,333	31,873	62.6	1,782,310	656,826	833	140	14.4	235
Northwestern Region:												
Chi. & North Western	1931 8,459	1,152,072	1,207,207	29,430	29,217	61.2	1,786,472	642,559	673	117	14.8	144
	1930 8,459	1,285,949	1,348,709	25,115	32,854	59.7	2,036,450	756,857	742	96	11.4	130
Chi. Gt. Western	1931 1,459	272,377	272,474	33,505	8,736	60.5	565,149	234,713	99	16	14.0	6
	1930 1,459	262,761	282,834	23,924	8,216	61.4	482,059	180,775	94	11	10.3	9
Chi., Milw., St. P. & Pac.	1931 11,299	1,402,625	1,491,699	85,934	36,440	60.5	2,282,740	900,090	781	141	15.3	306
	1930 11,313	1,521,643	1,612,544	86,984	42,190	61.1	2,611,885	1,058,658	795	147	15.6	242
Chi., St. P., Minn. & Om.	1931 1,714	249,586	271,433	13,046	5,136	64.4	299,281	119,131	151	23	13.0	57
	1930 1,724	294,185	324,459	14,348	6,115	64.0	361,364	148,736	151	27	14.9	37
Great Northern	1931 8,365	668,492	673,504	19,940	21,047	63.2	1,363,631	616,584	498	143	22.3	139
	1930 8,338	782,761	794,179	32,811	27,495	62.8	1,774,082	845,342	454	163	26.5	64
Minn., St. P. & S. St. M.	1931 4,356	369,871	375,249	3,908	8,074	63.1	461,944	186,754	159	68	29.8	26
	1930 4,351	410,001	419,876	3,384	10,853	65.0	604,309	255,855	175	44	20.1	25
Northern Pacific	1931 6,428	696,171	734,553	43,356	17,935	64.6	1,067,055	387,645	389	123	24.0	70
	1930 6,474	712,858	753,788	46,619	20,686	65.9	1,209,084	475,333	393	120	23.3	45
Oreg.-Wash. R. R. & Nav.	1931 2,218	158,643	163,982	8,466	4,157	69.5	238,026	100,010	116	18	13.5	50
	1930 2,246	181,828	190,305	10,633	4,916	69.7	282,249	121,439	120	21	14.8	41
Central Western Region:												
Alton	1931 1,000	241,955	265,313	2,368	5,728	62.8	369,067	134,126	107	25	18.6	19
	1930 1,000	293,712	319,075	2,937	7,061	63.2	439,048	169,833	129	17	12.0	24
Atch., Top. & S. Fe (incl. P. & S. F.)	1931 11,546	1,801,342	1,947,650	85,838	55,441	60.8	3,694,564	1,441,297	737	182	19.8	154
	1930 11,262	1,780,406	1,928,018	88,643	56,473	61.5	3,602,907	1,363,564	801	150	15.8	190
Chi., Burl. & Quincy	1931 9,257	1,143,126	1,175,412	33,934	32,502	61.1	1,934,590	848,063	591	111	15.9	77
	1930 9,275	1,325,061	1,385,737	56,200	40,737	61.8	2,494,936	1,150,171	639	140	18.0	40
Chi., Rock I. & Pacific	1931 7,593	1,291,542	1,374,738	10,175	31,869	61.0	2,058,288	856,344	519	122	19.1	102
	1930 7,593	1,352,308	1,429,342	12,889	33,559	61.3	2,113,101	867,241	553	125	18.5	92
Denver & R. G. Wn.	1931 2,520	208,925	224,279	19,281	5,803	59.7	360,318	130,874	230	16	6.5	87
	1930 2,562	251,800	280,787	34,438	6,730	58.2	440,186	168,055	212	37	15.1	49
Los Angeles & Salt Lake	1931 1,241	157,474	172,751	17,680	4,499	66.7	254,911	91,069	100	13	11.3	35
	1930 1,220	155,694	172,300	21,527	4,569	65.5	271,392	102,046	113	4	3.4	41
Oregon Short Line	1931 2,532	242,234	251,026	13,799	6,215	63.3	362,281	133,641	163	9	5.1	67
	1930 2,539	254,446	262,106	15,686	7,056	64.0	418,713	163,158	161	14	8.1	61
So. Pacific—Pacific Lines	1931 8,948	1,359,401	1,460,243	166,063	41,257	58.1	2,652,283	803,564	665	263	28.3	176
	1930 8,981	1,468,191	1,593,484	187,956	46,018	58.9	2,948,568	954,478	721	205	22.2	161
Union Pacific	1931 3,766	1,023,753	1,045,909	44,796	33,569	53.6	2,244,487	702,197	397	45	10.3	134
	1930 3,765	1,147,108	1,173,541	59,885	38,398	60.3	2,425,873	877,343	388	55	12.4	89
Southwestern Region:												
Gulf, Colo. & S. Fe	1931 1,965	285,212	315,942	8,549	8,881	64.3	624,902	307,397	111	11	9.1	17
	1930 1,949	293,271	330,529	9,077	10,434	61.6	739,957	356,356	111	16	12.3	11
Mo.-Kans.-Texas Lines	1931 3,282	398,743	405,285	6,452	11,135	60.1	691,655	271,716	172	56	24.6	74
	1930 3,176	427,245	437,657	8,762	13,352	58.5	848,285	349,537	161	78	32.6	57
Missouri Pacific	1931 7,417	1,288,432	1,336,669	40,242	35,575	61.0	2,314,649	927,125	520	91	14.8	165
	1930 7,423	1,414,951	1,468,431	37,620	40,594	61.4	2,623,326	1,111,608	535	92	14.6	151
St. Louis-San Francisco	1931 5,175	681,911	688,497	8,831	15,642	59.7	971,910	375,026	404	60	12.9	82
	1930 5,169	719,020	728,316	7,943	18,318	58.5	1,145,998	445,924	364	87	19.3	59
St. Louis Southwestern Lines	1931 1,902	226,467	234,353	3,148	6,285	61.1	371,255	121,263	110	26	19.1	27
	1930 1,805	292,297	295,595	3,999	7,452	62.2	439,827	154,807	102	24	19.0	13
Texas & New Orleans	1931 4,686	562,890	566,282	941	12,871	57.6	833,398	295,881	223	101	31.2	35
	1930 4,630	655,857	658,418	2,182	15,978	61.2	990,411	378,143	274	48	14.8	71
Texas & Pacific	1931 1,946	346,967	346,967	3,455	9,432	62.4	573,704	196,326	183	65	26.3	31
	1930 1,951	447,330	447,330	9,115	12,265	57.4	798,022	277,870	196	41	17.3	35

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Compared with July, 1930, for Roads with Annual Operating Revenues Above $25,000,000

Region, road and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross ton-miles per train-mile, excluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive-miles per locomotive-day
New England Region:													
Boston & Alban.....1931	3,557	2,957	6,514	12.4	22,317	1,446	481	17.3	327	28.8	5,300	145	38.6
1930	3,617	3,573	7,190	6.8	21,004	1,509	531	18.8	356	29.5	6,290	134	46.1
Boston & Maine.....1931	10,901	7,868	18,769	10.3	21,830	1,677	604	18.5	317	25.1	2,881	105	42.1
1930	11,562	8,775	20,337	7.0	20,265	1,695	649	19.9	344	24.9	3,388	104	48.0
N. Y., New H. & Hart..1931	18,503	12,719	31,222	15.5	24,570	1,706	615	19.7	284	22.8	4,284	100	51.9
1930	18,282	13,461	31,743	13.7	24,278	1,821	685	21.0	303	23.0	4,569	100	50.1
Great Lakes Region:													
Delaware & Hudson.....1931	11,683	3,567	15,250	3.6	25,188	1,930	857	27.7	444	26.7	7,740	117	41.7
1930	10,396	4,265	14,661	4.1	24,735	1,929	872	28.0	538	31.2	9,008	116	47.5
Del., Lack. & Western..1931	18,978	4,384	23,362	6.6	25,244	1,832	719	22.2	376	25.6	8,807	124	56.3
1930	18,434	5,331	23,765	4.8	24,852	1,916	782	23.5	451	29.1	10,732	123	57.8
Erie (inc. Chi. & Erie)..1931	35,447	12,863	48,310	4.3	39,597	2,672	938	21.7	459	35.6	9,581	92	53.7
1930	36,170	14,669	50,839	4.2	37,716	2,667	1,014	23.4	512	36.1	11,240	98	61.2
Grand Trunk Western....1931	5,089	8,035	13,124	9.7	24,359	1,509	508	20.4	274	23.3	3,519	96	47.6
1930	4,509	8,994	13,503	7.2	23,571	1,622	575	20.5	316	24.8	4,190	95	50.9
Lehigh Valley 1931	22,259	5,142	27,401	9.7	29,341	1,776	722	24.7	353	22.6	7,203	125	42.3
1930	20,334	7,938	28,272	8.4	28,217	1,960	861	27.5	448	25.6	9,433	131	50.8
Michigan Central 1931	24,203	16,098	40,301	6.6	33,453	1,806	577	18.7	180	16.3	3,877	99	60.4
1930	24,617	13,515	38,132	4.7	33,013	1,929	649	20.1	228	19.4	4,670	99	64.6
New York Central.....1931	78,694	63,976	142,670	10.9	33,090	2,257	914	25.0	334	22.0	7,359	93	43.4
1930	76,564	63,706	140,270	5.3	32,285	2,357	988	26.1	390	24.7	8,463	95	47.2
New York, Chi. & St. L..1931	15,989	7,521	23,510	9.8	30,020	1,872	645	20.2	413	33.9	5,855	93	63.9
1930	15,974	8,599	24,573	8.4	28,583	1,882	675	21.1	469	36.8	6,938	92	68.1
Pere Marquette 1931	12,403	4,387	16,790	3.6	21,693	1,436	558	24.3	340	23.4	2,591	86	59.8
1930	9,742	6,063	15,805	4.1	22,524	1,532	587	23.7	459	32.6	3,297	88	66.8
Pitts. & Lake Erie.....1931	20,257	4,569	24,826	9.3	40,214	3,132	1,788	47.8	186	6.5	19,693	90	34.3
1930	16,863	6,011	22,874	6.2	41,953	3,179	1,856	47.5	307	10.3	30,262	85	54.5
Wabash 1931	20,684	9,074	29,758	8.1	33,902	1,768	579	19.6	427	35.9	5,084	101	56.4
1930	18,541	10,234	28,775	3.3	31,947	1,901	685	21.4	506	38.2	5,833	102	61.6
Central Eastern Region:													
Baltimore & Ohio.....1931	79,301	18,560	97,861	5.7	26,528	2,052	882	28.7	390	22.8	6,901	129	47.1
1930	80,183	23,899	104,082	5.1	25,587	2,187	989	30.7	467	25.1	8,767	130	53.3
Big Four Lines.....1931	24,771	21,809	46,580	6.8	30,894	1,902	825	27.7	353	21.5	6,051	102	48.8
1930	25,089	21,281	46,370	3.7	29,439	1,908	857	28.8	428	24.4	7,321	104	53.2
Central of New Jersey...1931	17,126	7,632	24,758	12.8	24,289	1,872	801	28.7	192	11.9	6,860	131	40.0
1930	17,928	8,813	26,741	7.0	24,460	1,905	864	31.0	256	14.5	9,872	139	51.1
Chicago & Eastern Ill....1931	6,005	2,954	8,959	9.6	25,827	1,491	569	23.7	373	27.0	3,562	111	37.3
1930	13,263	3,718	16,981	44.2	26,483	1,644	679	24.4	261	16.7	4,690	112	43.1
Elgin, Joliet & Eastern..1931	9,316	3,771	13,087	5.3	15,994	1,853	903	38.1	197	8.9	5,763	113	33.2
1930	9,666	6,128	15,794	4.6	15,661	2,037	1,047	39.3	244	10.1	8,523	112	43.1
Long Island 1931	792	4,552	5,344	.8	6,498	768	301	29.2	80	5.3	1,065	298	39.3
1930	780	4,587	5,367	1.3	6,259	826	315	28.6	79	5.4	1,066	330	37.6
Pennsylvania System.....1931	240,487	59,035	299,522	5.8	31,359	2,266	973	28.3	339	19.4	9,549	112	51.1
1930	229,746	71,861	301,607	4.1	30,077	2,400	1,067	29.8	401	21.7	11,321	112	51.7
Reading 1931	37,346	10,317	47,663	4.6	23,544	1,949	891	33.3	288	15.0	9,447	127	46.8
1930	33,384	10,611	43,995	4.6	22,972	1,967	941	34.7	390	19.5	11,840	130	56.2
Pocahontas Region:													
Chesapeake & Ohio.....1931	49,090	9,056	58,146	3.0	45,416	3,362	1,807	46.1	975	38.7	18,225	70	46.6
1930	43,071	10,311	53,382	2.5	39,704	3,054	1,641	44.6	1,087	43.8	18,808	78	61.5
Norfolk & Western.....1931	37,548	5,298	42,846	.9	43,223	2,983	1,546	43.5	800	32.0	15,089	102	50.5
1930	36,030	7,437	43,467	.9	43,818	3,119	1,632	44.0	911	35.9	17,751	106	55.3
Southern Region:													
Atlantic Coast Line.....1931	24,436	4,867	29,303	7.5	19,365	1,127	377	18.7	243	22.2	1,379	113	40.5
1930	22,069	5,176	27,245	6.4	20,229	1,334	462	19.9	304	26.3	1,606	103	41.1
Central of Georgia.....1931	7,264	4,044	11,308	13.5	18,842	1,213	409	18.8	345	29.0	2,054	122	67.6
1930	6,359	4,014	10,373	10.3	18,470	1,254	456	19.7	398	30.9	2,174	123	62.1
Ill. Cent. (inc. Y. & M. V.)1931	52,436	14,173	66,609	10.8	24,692	1,538	578	25.1	430	29.0	4,290	125	55.7
1930	48,971	17,071	66,042	4.9	24,993	1,701	676	26.3	523	33.2	5,160	118	61.2
Louisville & Nashville....1931	50,169	8,391	58,560	13.7	22,502	1,492	678	31.3	439	24.2	4,884	131	58.9
1930	49,642	10,588	60,230	10.1	22,064	1,500	691	31.6	506	27.4	5,802	125	68.2
Seaboard Air Line.....1931	16,732	4,571	21,303	10.5	19,669	1,330	468	20.5	363	29.8	1,731	122	60.2
1930	14,678	5,027	19,705	3.6	18,733	1,357	489	20.8	416	32.9	1,829	124	58.2
Southern 1931	55,035	11,425	66,460	13.6	21,009	1,309	473	19.7	291	23.3	2,901	140	43.4
1930	53,511	13,375	66,886	12.6	20,329	1,327	489	20.6	317	24.6	3,174	140	46.1
Northwestern Region:													
Chi. & North Western...1931	45,012	20,124	65,136	8.2	22,060	1,551	558	22.0	318	23.6	2,451	114	50.5
1930	50,448	23,759	74,207	7.6	21,166	1,584	589	23.0	329	23.9	2,886	113	52.9
Chi. Gt. Western.....1931	4,220	4,347	8,567	8.3	32,757	2,075	862	26.9	884	54.3	5,189	109	85.5
1930	4,102	3,925	8,027	6.1	28,102	1,835	688	22.0	726	53.8	3,997	117	94.0
Chi., Milw., St. P. & Pac.1931	60,322	14,345	74,667	2.5	24,021	1,627	642	24.7	389	26.0	2,570	111	55.2
1930	59,086	17,149	76,235	2.8	23,574	1,716	696	25.1	448	29.2	3,019	111	58.2
Chi., St. P., Minn. & Om.1931	2,208	8,127	10,335	7.9	17,164	1,199	477	23.2	372	24.9	2,242	107	52.9
1930	2,411	9,679	12,090	7.2	16,874	1,228	506	24.3	397	25.5	2,784	109	61.4
Great Northern 1931	43,864	7,120	50,984	5.7	29,547	2,040	922	29.3	390	21.1	2,378	108	34.9
1930	42,758	8,316	51,074	6.1	30,541	2,266	1,080	30.7	534	27.6	3,270	102	43.2
Minn., St. P. & S. St. M.1931	20,882	3,474	24,356	3.8	18,315	1,249	505	23.1	248	17.0	1,383	97	53.9
1930	20,155	4,402	24,557	3.2	19,518	1,474	624	23.6	339	22.1	1,897	91	62.3
Northern Pacific 1931	41,927	4,882	46,809	10.4	24,750	1,533	557	21.6	267	19.1	1,945	138	49.0
1930	41,478	5,349	46,827	9.5	24,577	1,696	667	23.0	327	21.6	2,368	134	50.4
Ore.-Wash. R.R. & Nav..1931	8,527	2,390	10,917	2.8	22,702	1,500	630	24.1	296	17.7	1,455	140	41.6
1930	8,062	3,217	11,279	4.5	21,934	1,552	668	24.7	347	20.2	1,745	145	46.1
Central Western Region:													
Alton 1931	10,779	3,106	13,885	9.1	28,398	1,525	554	23.4	312	21.2	4,328	111	65.4
1930	10,472	4,669	15,141	6.1	24,559	1,495	578	24.1	362	23.8	5,480	112	71.2
Atch., Top. & S. Fe (incl. 1931	68,142	15,446	83,588	7.9	33,679	2,051	800	26.0	556	35.2	4,027	90	71.3
P. & S. F.).....1930	66,928	17,667	84,595	7.3	31,958	2,024	766	24.1	520	35.0	3,906	94	68.4
Chi., Burl. & Quincy....1931	44,449	13,804	58,253	7.2	25,439	1,692	742	26.1	470	29.5	2,955	108	55.6
1930	46,383	17,811	64,194	5.5	25,847	1,883	868	28.2	578	33.1	4,000	105	59.7
Chi., Rock I. & Pacific..1931	37,438	14,012	51,450	11.8	24,783	1,594	663	26.9	537	32.8	3,638	115	69.7
1930	35,245	16,202	51,447	7.3	22,559	1,563	641	25.8	544	34.3	3,685	119	68.6
Denver & R. G. Wn.....1931	13,211	3,140	16,351	2.6	25,268	1,725	626	22.6	258	19.2	1,675	149	32.0
1930	12,532	4,501	17,033	2.5	23,311	1,748	667	25.0	318	21.9	2,116	153	40.8
Los Angeles & Salt Lake.1931	4,560	1,091	5,651	2.3	25,660	1,619	578	20.2	520	38.5	2,368	130	54.4
1930	4,425	1,202	5,627	2.5	25,533	1,743	655	22.3	585	40.0	2,698	130	53.6
Oregon Short Line.....1931	7,546	2,707	10,253	7.5	24,301	1,496	552	21.5	420	30.9	1,703	105	49.8
1930	8,648	3,350	11,998	6.5	24,595	1,646	641	23.1	439	29.7	2,073	114	51.1
So. Pacific—Pacific Lines.1931	41,962	24,631	66,593	8.1	29,284	1,951	591	19.5	389	34.4	2,897	108	56.5
1930	40,536	26,649	67,185	5.1	28,030	2,008	650	20.7	458	37.5	3,428	109	62.0
Union Pacific 1931	25,232	9,178	34,410	6.2	42,202	2,192	686	20.9	658	58.7	6,015	102	79.5
1930	23,745	10,642	34,387	5.7	38,507	2,115	765	22.8	823	59.8	7,516	97	89.8
Southwestern Region:													
Gulf, Colo. & S. Fe.....1931	11,157	2,861	14,018	2.7	36,804	2,191	1,078	34.6	707	31.8	5,046	83	86.0
1930	12,052	3,202	15,254	4.5	39,253	2,523	1,215	34.2	754	35.8	5,898	81	86.6
Mo.-Kans.-Texas Lines...1931	12,800	5,733	18,533	4.4	27,186	1,735	681	24.4	473	32.3	2,671	82	58.3
1930	17,838	6,016	23,854	4.5	30,191	1,985	818	26.2	473	30.8	3,550	81	60.2
Missouri Pacific 1931	32,270	17,893	50,163	12.3	28,353	1,796	720	26.1	596	37.5	4,032	110	72.8
1930	32,573	18,320	50,893	6.8	26,945	1,855	786	27.4	705	41.9	4,831	108	77.5
St. Louis-San Francisco..1931	26,551	6,811	33,362	3.1	22,164	1,425	550	24.0	363	25.3	2,338	121	48.5
1930	26,420	7,731	34,151	3.1	21,846	1,594	620	24.3	421	29.6	2,783	123	52.7
St. Louis Southwestern 1931	6,080	4,235	10,315	7.4	27,026	1,639	535	19.3	379	32.2	2,057	93	56.4
Lines 1930	6,865	3,584	10,449	5.2	24,124	1,505	530	20.8	478	37.0	2,767	89	77.0
Texas & New Orleans....1931	12,086	12,829	24,915	6.8	23,345	1,481	526	23.0	383	28.9	2,037	87	56.4
1930	11,751	13,275	25,026	4.5	22,848	1,510	577	23.7	487	33.7	2,606	85	66.2
Texas & Pacific.....1931	6,404	5,592	11,996	10.2	26,220	1,653	566	20.8	528	40.6	3,255	81	45.6
1930	6,482	5,096	11,578	6.5	27,855	1,784	621	22.7	774	59.5	4,594	84	62.2

News

(*Continued from page 451*)

enter into the permanent rate structure and "overturn the work of the commission, the carriers and the shipping public over a long period of years." He also suggested that the commission might except certain commodities, such as agricultural commodities and fertilizers, and that the surcharge should not be applied to shipments amounting to less than $5.

The next brief to arrive was that of the Merchants' Association of New York, the Boston Chamber of Commerce and the New England Traffic League, which proposed, in lieu of a percentage advance, a specific "arbitrary" increase to be applied as an emergency measure to all rates irrespective of their measure, in order that all transportation costs may bear the "tax" necessary to effect the result found proper by the commission.

On behalf of 153 short line railroads Ben B. Cain, general counsel of the American Short Line Railroad Association, filed a brief urging the need of the increase asked by the railroads but suggesting that agriculture has made a strong showing that an increase as applied to that industry would not result in a substantial increase in revenues and that 9.6 per cent of the originated tonage of the railroads is agricultural products. He predicted that the commission would not seriously consider the argument that an increase would drive a large part of the traffic to trucks, saying that "everybody knows that there is a limit to truck transportation" and that it is common knowledge that the public highways are already being used to their capacity by motor transportation.

C. E. Cotterill, on behalf of 350 companies concerned with class rates in Official Classification territory, objected particularly to the idea of superimposing a 15 per cent increase on the increases in class rates which will become effective on December 3 under the commission's order in the eastern class rate case, which he said would amount to as much as 10 per cent in the upper classes. The Youngstown Chamber of Commerce opposed an increase in rates and suggested instead a reduction. The Nevada Consolidated Copper Company and the Utah Copper Company joined in a brief asking that no increase be allowed on copper bullion from Utah and Nevada.

Freight Traffic in July

Freight traffic moved by Class I railroads in the first seven months of 1931 amounted to 204,602,756,000 net ton-miles, according to reports compiled by the Bureau of Railway Economics. This was a reduction of 43,238,050,000 net ton-miles, or 17.4 per cent, under the corresponding period in 1930, and of 27.1 per cent under the same period in 1929. The Eastern district reported a reduction of 17.7 per cent, the Southern 17.5 per cent, and the Western 17.1 per cent. For July, the total amounted to 30,275,956,000 net ton-miles, a reduction from July 1930 of 5,318,083,000 net ton-miles, or 14.9 per cent. The Eastern district, for July, showed a reduction of 15.4 per cent, the Southern district 14.1 per cent and the Western 14.7 per cent.

Security Owners Favor Broader Powers for Railways

Broader powers for the railways in the matter of engaging in other forms of transportation "would tend to produce substantial operating economies, adding also to the stability of the carriers and the convenience of the public," according to a statement entitled "Efficient Transportation—A Public Responsibility," recently issued by the National Association of Owners of Railroad and Public Utilities Securities.

The statement was in general an answer to the charge that the railroads have been derelict in their efforts to meet the inroads of other forms of transportation on their traffic. It lists the legislative restrictions imposed on the railways and the competitive advantages which indirect subsidization gives their competitors.

"Despite the nature of the competition to which they are subjected," the statement concludes, "the railroads still carry 75 per cent of the nation's traffic. The public needs its railroads and must sustain them. If it has chosen to deny to them the privileges of equality of operation with their competitors and to hinder them from taking steps which would result both in protection of their own position and more adequate service to the public, it must pay the price in increased rates until such time as existing laws may be modified or revised."

Coming Shippers' Meetings

Meetings of shippers' advisory boards have been announced for September and October as follows: The Southwest at Wichita Falls, Tex., on September 24; the Central Western at Cheyenne, Wyo., on September 29; the Mid-west at Chicago on October 1. and the Atlantic States at Philadelphia, Pa., on October 2.

Great Lakes Regional Advisory Board

The Great Lakes Regional Advisory Board will hold its regular meeting at the Mayflower Hotel, Akron, Ohio, on September 23. The meeting will be addressed by Daniel Willard, president of the Baltimore & Ohio, on present day railroad problems, and by John L. Lovett, manager of the Michigan Manufacturers' Association, on conditions in Russia and elsewhere in Europe.

N. Y. Railroad Club Meeting

A meeting of the New York Railroad Club was held on September 18, in the auditorium of the Engineering Societies building, 29 West Thirty-ninth street, New York. At this session, designated "Fire Prevention Night," W. F. Steffins, chief fire protection engineer, New York Central, delivered an adderss on "Fire Prevention as Applied to American Railroads." Mr. Steffins' address was followed by a short talk by Peter C. Spence, chief, Bureau of Fire Prevention, New York City Fire Department.

Salary Reductions

Salaries of all officers of the Chicago, Rock Island & Pacific, amounting to more than $3,000 a year each, will be cut from five to twenty per cent on October 1. Eighty-five per cent of the employees of the Gulf, Mobile & Northern, those other than train service employees, have voluntarily agreed to a 10 per cent reduction in salaries as long as the railroad is unable to cover interest charges.

Railway Men on Relief Committee

R. H. Aishton, president of the American Railway Association, and Alvanley Johnston, grand chief engineer of the Brotherhood of Locomotive Engineers, who were recently appointed members of the advisory committee of the President's Organization on Unemployment Relief, of which Walter S. Gifford is director, have been appointed also members of a committee on co-operation with national groups and associations.

Shipper Prosecuted For False Claims

The Interstate Commerce Commission has announced that on September 14 the Golden Pickle Works, Inc., and Harry Golden each pleaded guilty in the federal court at Brooklyn, N. Y., to a joint indictment charging the filing of false claims with several railroads. Judge Sheppard imposed a fine of $2,500 against Harry Golden and suspended sentence as to the corporation, which, however, was also fined $7,000 under another indictment. Evidence was furnished by the Bureau of Inquiry of the commission.

Number of Employees Again Reduced

A further reduction in the number of railway employees was effected between the middle of June and the middle of July, according to the Interstate Commerce Commission's preliminary statement on railway employment as of the latter date. The number was 1,309,794, a decrease of 7,614 as compared with the number in June. This was a reduction of 14.49 per cent as compared with July, 1930, and of 24.94 per cent as compared with July, 1929. The number of maintenance of way employees was 34.97 per cent less than in July, 1929, while the number of train and engine service employees was 21.14 per cent less.

California Grapes to New York by Boat

In order to demonstrate the practicability of transporting the state's highly perishable deciduous fruits and grapes to the Atlantic coast by water, the California Growers' and Shippers' Protective League dispatched a sample shipment of 4,500 boxes of table grapes for New York on September 12 aboard the Panama Pacific Line's steamship "Virginia." This shipment is being carried in one of the ship's ventilated refrigerator rooms,

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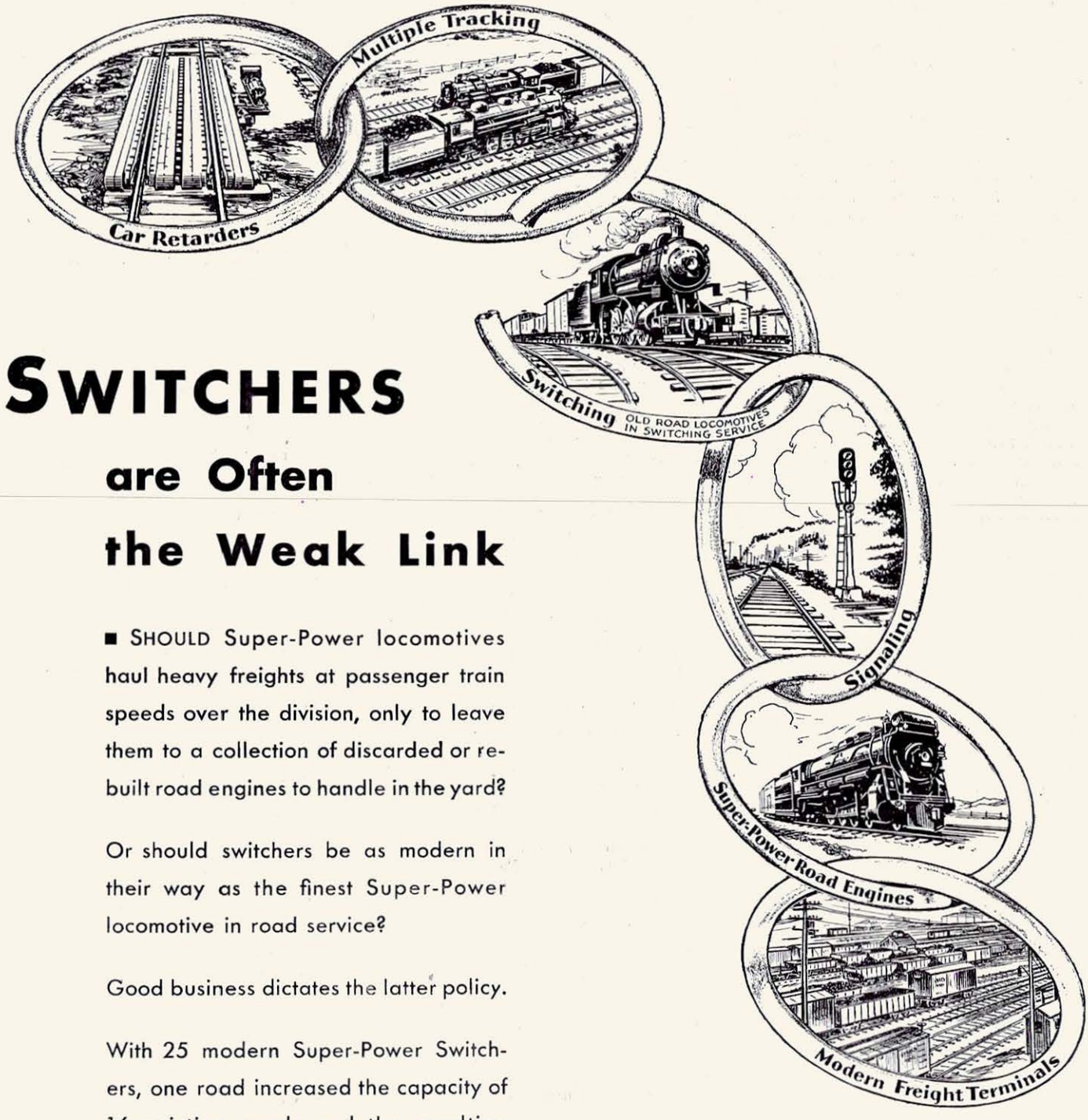

SWITCHERS are Often the Weak Link

■ SHOULD Super-Power locomotives haul heavy freights at passenger train speeds over the division, only to leave them to a collection of discarded or rebuilt road engines to handle in the yard?

Or should switchers be as modern in their way as the finest Super-Power locomotive in road service?

Good business dictates the latter policy.

With 25 modern Super-Power Switchers, one road increased the capacity of 16 existing yards and the resulting operating savings will pay for the engines in five years.

LIMA LOCOMOTIVE WORKS INCORPORATED

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and after arrival at destination will be put into the Erie Railroad's Duane Street freight station, where the grapes will be sold at auction.

Questionnaire Issued to Private Car Owners

The Interstate Commerce Commission has addressed a questionnaire to owners and operators of private freight cars in connection with its investigation of practices of carriers affecting operating revenues and expenses, calling for detailed information regarding their equipment and their receipts from railroads and shippers. Information also is asked regarding the earnings and mileage of the cars, commissions and other allowances or proportion of freight revenue received from railroads for soliciting or developing freight traffic, payments to railroads for hauling cars, expenses for maintenance, salaries and expenses of officers and employees, office expenses, names of stockholders of car line companies, etc.

Coal Barges on Upper Mississippi

Major General Thomas Q. Ashburn, chairman of the board of the Inland Waterways Corporation, has announced the inauguration of a coal-carrying service between St. Louis and St. Paul on the Mississippi river, "to demonstrate to coal dealers the economic justification for them to construct their own fleets of barges" for the transportation of coal via the Ohio and upper Mississippi rivers. It was stated that the service had been made possible through the co-operation of the Inland Waterways Corporation, the city of St. Paul, the O'Gara Coal Company and the Kavanaugh Coal Company; and that two barges a week, each loaded with 800 to 1,000 tons, would be sent north during the remainder of the season. A movement of iron ore downstream was suggested as a corollary as soon as joint rates can be arranged.

Air-Conditioned Cars on the Boston & Maine

The Boston & Maine has placed in test service on its Boston-Portland run a coach equipped with a new method of air cooling and air cleaning which has been found in preliminary tests to provide a temperature 12 to 14 degrees cooler that the outside air. The source of refrigeration is ice, the ice being carried in bunkers beneath the car. Water, cooled by being sprayed over this ice, is circulated by pumps through concealed radiators at either end of the car. The cool air is then drawn across the car ceiling from end to end, thus lowering the temperature gradually and without drafts. The air is dehumidified and filtered by other phases of the process, and the car is kept under a slight positive air pressure which, it is stated, prevents outside dirt and dust from entering, except when the doors are opened.

A pre-cooling machine developed by the Boston & Maine, which is much the same as that of the equipment installed in the coach, circulates the water sprayed over ice in radiators to cool the air, the air thus cooled being forced through a canvas duct into the car before being entered by the passengers.

On a day when the temperature outside was 86, the temperature in the air-cooled car was 72 to 74. The pre-cooling on a day when the outside temperature was 89 brought the car temperature to 75 and was said to have kept the car within a few degrees of this figure for several hours.

In each of these two methods of improving the comfort of passenger equipment—one for its own coaches and one for Pullman cars—the Boston & Maine has had the co-operation of the Metropolitan Ice Company of Boston, Mass., which is engaged in the application and extension of recent air-conditioning developments. The mechanical engineering department of the railroad worked out the details of engineering design, collaborating with the engineers of the Metropolitan Ice Company.

New Forest Products Laboratory

The contract for the construction of what is planned to be the largest and most complete establishment in the world for research on wood was recently awarded by the United States Department of Agriculture. This structure will be located at Madison, Wis., and will provide larger quarters for the Forests Products Laboratory of the United States Forest Service. It is being financed by a $900,000 Congressional appropriation. Holabird & Root, Chicago, are the architects and the contractor is C. B. Fritz & Co., Madison, Wis. The new building will be about 275 ft. square and will have six stories, with a total floor space of 175,000 sq. ft. The building will be thoroughly equipped with modern technical and scientific facilities for testing wood and other forest products.

Railroads Take Space at Century of Progress Exposition

Several railroads and producers of railroad equipment and supplies, as well as other agencies of transportation, have signed contracts for exhibit space in the Travel and Transportation building at the Century of Progress to be held in Chicago in 1933. The railroads include the Pennsylvania, the Baltimore & Ohio, the Illinois Central, the Chicago, Rock Island & Pacific, the Chicago & North Western and the Chicago, Milwaukee, St. Paul & Pacific. In addition, the General American Tank Car Corp., the American Steel Foundries and the Ahlberg Bearing Company have purchased space.

Although the railroads are expected to present exhibits showing train history, their tourist and scenic advantages, passenger service, their role as carriers of freight, their public service and accomplishments and the vital part they play in making possible living conditions as they are today, no definite plans have been announced. The Chicago & North Western is expected to exhibit its Pioneer, the locomotive which made the first trip from Chicago to Maywood, Ill. on October 24, 1848. It will be shown on strap rails nailed to wooden rails as it ran at that time. The Atchison, Topeka & Santa Fe will portray Indian life in an exhibit to be placed in the anthropological building.

August Locomotive Shipments

August shipments of railroad locomotives from principal manufacturing plants, based on reports received by the Department of Commerce, totaled 13 locomotives, as compared with 13 in July and 77 in August, 1930. The following table shows shipments and unfilled orders of locomotives for August, 1930 and 1931, the 1930 totals and totals for the first eight months of the two years:

Year and Month	Railroad Locomotive Shipments				
	Domestic			Foreign	
	Total	Steam	Electric	Steam	Electric
1931					
August	13	2	1	10	..
Total (8 mos.)	127	95	20	12	..
1930					
August	77	68	5	4	..
Total (8 mos.)	556	522	15	16	3
Total (year)	763	706	33	17	7

	Unfilled Orders, end of August				
	Domestic			Foreign	
	Total	Steam	Electric	Steam	Electric
1931	74	18	55	1	..
1930	234	193	36	1	4

Victoria Seeks Same Grain Rate as Vancouver

Judgment was reserved by the Board of Railway Commissioners at Ottawa last week on the application of the city of Victoria, B. C., and the Panama-Pacific Grain Company. The application seeks an order from the board directing the Canadian Pacific to fix and incorporate in its tariff an export grain rate to terminal elevators in Victoria, B. C., the same as prevails on shipments to Vancouver.

The application further asked that the rate be "equal to the export grain rate to said elevator now incorporated in the special competitive tariff issued by the Canadian National."

On behalf of the Canadian Pacific Railway, E. P. Flintoft, Montreal, stated that it was impossible for the railway to quote the same rate for shipments to Victoria as was in effect at Vancouver, owing to the fact that the Canadian Pacific had not the facilities for handling grain at the port of Victoria.

Great Northern California Line Opened

The Great Northern, on September 15, began using its new California line, when it started a trainload of 50 cars of Shevlin pine products from McCloud, Cal., to Minneapolis, Minn., and St. Paul. The consignment from the McCloud River Lumber Company was moved over the McCloud River Railroad and the Great Northern, to a point on the California extension, north of Bieber, and thence over the California extension of the Great Northern. The Western Pacific extension from Bieber to Keddie will be completed in November, the second of that month having been set tentatively as the day for the official "spike-driving" that will connect the Great Northern and the Western Pacific and thereby give the

Continued on Next Left Hand Page

To the TOP of the Continental Divide

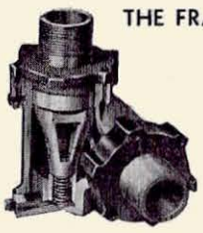
...with the help of the BOOSTER

■ THE LOCOMOTIVE BOOSTER

HOMESTEAKS, ten miles east of Butte, Montana marks the summit of the continental divide on the Northern Pacific. Over this spot, 6,356 feet above sea level, the North Coast Limited, east and west bound, is hauled by Booster equipped locomotives.

The Northern Pacific uses the Booster on 18 of its fast passenger engines to secure extra power for climbing steep grades, to assure smooth starting, and rapid acceleration to road speeds. The result is greater comfort to the traveler and on-time runs over the road.

Reserve power from the Booster is used only a small percentage of the time. But it is always available when needed. In the emergency, the Booster gives the effect of another pair of drivers.



THE FRANKLIN SLEEVE JOINT
Uses flat gaskets—the cheapest to buy when replacement is necessary

FRANKLIN RAILWAY SUPPLY COMPANY
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NEW YORK · CHICAGO
ST. LOUIS · SAN FRANCISCO · MONTREAL

Great Northern a direct route into San Francisco. Freight service will begin shortly after the completion of the line, but passenger trains will not be run until late next spring.

Southeastern Shippers' Advisory Board

The Southeastern Shippers' Advisory Board, at its regular meeting at Birmingham, Ala., on September 10, reviewed business conditions with a view to predicting the probable volume of freight to be offered to the railroads in the coming fourth quarter of 1931. The total of the estimates by the commodity committees shows a volume of business closely approaching that of the fourth quarter of 1930, but the changes, both favorable and unfavorable, show a number of large percentages.

In pulp and products there is anticipated an increase of 10 per cent; in cotton and cotton seed, 10 per cent, and in petroleum and its products, 5 per cent. The committee on fertilizer, etc., anticipates a 20 per cent decrease; grain and grain products, 10 per cent decrease, and coal and coke, 15 per cent. In naval stores the expected decrease is 20 per cent. In the other principal commodities

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 171 Steam Railways, Including 17 Switching and Terminal Companies.

FOR THE MONTH OF JULY, 1931 AND 1930

Item	United States		Eastern District		Southern District		Western District	
	1931	1930	1931	1930	1931	1930	1931	1930
Average number of miles operated	243,067.26	242,685.94	60,295.45	60,348.52	46,170.56	46,149.66	136,601.25	136,187.76
Revenues:								
Freight	$290,348,456	$347,271,693	$115,128,259	$143,459,545	$52,095,513	$59,469,810	$123,124,684	$144,342,338
Passenger	50,271,990	65,805,912	28,906,219	36,823,410	5,041,444	6,885,571	16,324,327	22,096,931
Mail	8,589,769	8,878,697	3,333,122	3,401,042	1,433,443	1,489,345	3,823,204	3,988,310
Express	6,020,203	7,841,591	2,826,530	3,132,981	625,898	924,540	2,567,775	3,784,070
All other transportation	12,589,642	12,469,689	7,329,731	9,001,135	847,001	903,594	4,412,910	5,564,960
Incidental	8,662,659	10,989,481	4,478,219	5,424,909	1,064,317	1,227,318	3,120,123	4,337,254
Joint facility—Cr.	1,030,961	1,129,224	312,214	426,260	177,394	189,498	541,353	513,466
Joint facility—Dr.	367,263	288,739	79,345	92,159	22,101	31,858	265,817	164,722
Railway operating revenues	377,146,417	457,097,548	162,234,949	201,577,123	61,262,909	71,057,818	153,648,559	184,462,607
Expenses:								
Maintenance of way and structures	50,138,673	64,130,391	21,175,427	27,444,025	8,711,906	9,978,088	20,251,340	26,708,278
Maintenance of equipment	69,088,326	82,806,466	31,491,722	37,589,532	12,174,121	14,663,994	25,422,483	30,552,940
Traffic	10,082,219	10,850,965	4,010,659	4,147,842	1,809,483	1,898,427	4,262,077	4,804,696
Transportation	132,549,409	154,441,907	61,718,029	72,302,220	21,192,387	23,835,877	49,638,993	58,303,810
Miscellaneous operations	3,667,319	4,526,763	1,753,607	2,024,838	337,028	420,530	1,576,684	2,081,395
General	15,340,716	16,191,251	6,728,447	7,129,677	2,674,313	2,803,794	5,937,956	6,257,780
Transportation for investment—Cr.	739,340	1,328,755	107,049	298,341	117,197	95,100	515,094	935,314
Railway operating expenses	280,127,322	331,618,988	126,770,842	150,339,793	46,782,041	53,505,610	106,574,439	127,773,585
Net revenue from railway operations	97,019,095	125,478,560	35,464,107	51,237,330	14,480,868	17,552,208	47,074,120	56,689,022
Railway tax accruals	28,806,324	31,333,697	11,926,712	13,014,919	4,745,548	5,096,481	12,134,064	13,222,297
Uncollectible ry. revenues	87,304	96,142	43,840	33,254	12,193	16,254	31,271	46,634
Railway operating income	68,125,467	94,048,721	23,493,555	38,189,157	9,723,127	12,439,473	34,908,785	43,420,091
Equipment rents—Dr. balance	8,951,246	8,376,874	4,364,511	4,210,347	90,959	d130,721	4,495,776	4,297,248
Joint facility rent—Dr. balance	2,639,318	2,602,473	1,398,593	1,426,167	277,222	284,583	963,503	891,723
Net railway operating income	56,534,903	83,069,374	17,730,451	32,552,643	9,354,946	12,285,611	29,449,506	38,231,120
Ratio of expenses to revenues (per cent)	74.28	72.35	78.14	74.58	76.36	75.30	69.36	69.27

FOR SEVEN MONTHS ENDED WITH JULY, 1931 AND 1930

Average number of miles operated	242,873.78	242,709.61	60,289.25	60,354.45	46,124.27	46,140.13	136,460.26	136,215.03
Revenues:								
Freight	$1,964,129,950	$2,389,764,391	$833,697,900	$1,036,866,338	$376,710,155	$446,582,079	$753,721,895	$906,315,974
Passenger	342,435,216	446,592,839	193,891,892	242,727,326	43,897,007	61,511,839	104,646,317	142,353,674
Mail	61,096,081	64,378,551	23,502,649	24,529,550	10,339,678	10,822,368	27,253,754	29,026,633
Express	52,182,737	68,775,169	22,192,799	30,704,618	8,818,005	10,540,677	21,171,933	27,529,874
All other transportation	85,590,146	105,761,407	49,811,481	61,647,423	6,480,965	7,898,538	29,297,700	36,215,446
Incidental	54,310,893	68,638,683	28,965,526	35,537,596	7,799,831	9,609,761	17,545,536	23,491,326
Joint facility—Cr.	6,834,699	7,738,556	2,187,294	2,606,767	1,231,995	1,399,182	3,415,410	3,732,607
Joint facility—Dr.	1,995,870	2,296,106	537,251	691,115	176,777	237,783	1,281,842	1,367,208
Railway operating revenues	2,564,583,852	3,149,353,490	1,153,712,290	1,433,928,503	455,100,859	548,126,661	955,770,703	1,167,298,326
Expenses:								
Maintenance of way and structures	338,229,199	439,833,630	141,663,855	182,093,802	63,769,835	78,802,687	132,795,509	178,937,141
Maintenance of equipment	510,586,676	628,952,218	236,648,435	291,258,422	91,906,634	113,461,761	182,031,007	224,232,035
Traffic	70,754,126	77,551,829	27,343,390	29,617,017	13,096,753	14,201,946	30,313,983	33,732,866
Transportation	946,698,287	1,120,045,603	446,385,674	528,969,907	156,348,970	181,156,776	343,963,643	409,918,920
Miscellaneous operations	25,508,291	31,850,419	12,403,905	15,040,186	3,085,131	3,995,777	10,019,255	12,814,456
General	109,307,639	114,953,088	47,700,441	50,430,009	19,081,611	19,445,989	42,525,587	45,077,090
Transportation for investment—Cr.	4,182,105	7,619,399	721,629	1,542,251	507,957	680,712	2,952,519	5,396,436
Railway operating expenses	1,996,901,513	2,405,567,388	911,424,071	1,095,867,092	346,780,977	410,384,224	738,696,465	899,316,072
Net revenue from railway operations	567,682,339	743,786,102	242,288,219	338,061,411	108,319,882	137,742,437	217,074,238	267,982,254
Railway tax accruals	193,544,950	211,632,286	78,231,658	87,132,919	36,974,747	40,310,054	78,338,545	84,189,313
Uncollectible ry. revenues	466,341	611,095	173,814	247,121	101,024	102,824	191,503	261,150
Railway operating income	373,671,048	531,542,721	163,882,747	250,681,371	71,244,111	97,329,559	138,544,190	183,531,791
Equipment rents—Dr. balance	60,442,227	55,706,716	29,636,365	28,529,839	4,620,206	1,599,749	26,185,656	25,577,128
Joint facility rent—Dr. balance	18,143,777	15,387,419	10,005,435	7,615,556	1,909,825	1,685,026	6,228,517	6,086,837
Net railway operating income	295,085,044	460,448,586	124,240,947	214,535,976	64,714,080	94,044,784	106,130,017	151,867,826
Ratio of expenses to revenues (per cent)	77.86	76.38	79.00	76.42	76.20	74.87	77.29	77.04

d Deficit or other reverse items.

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to Revision.

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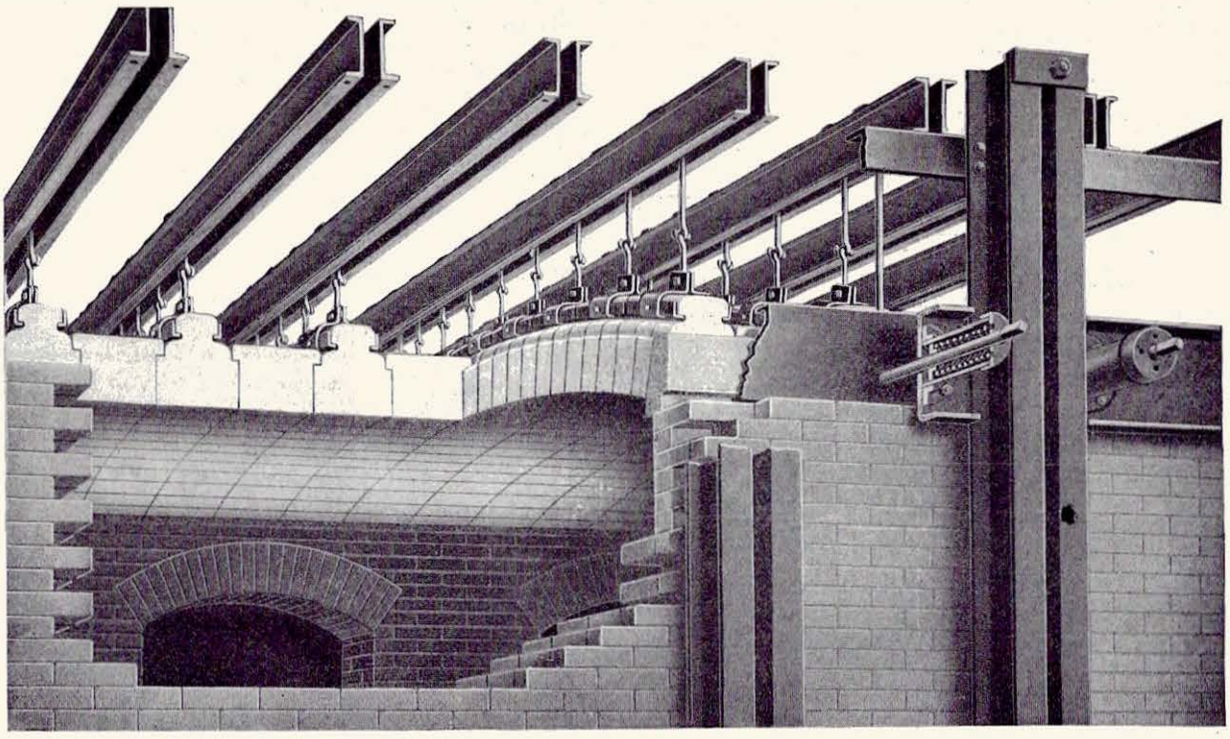

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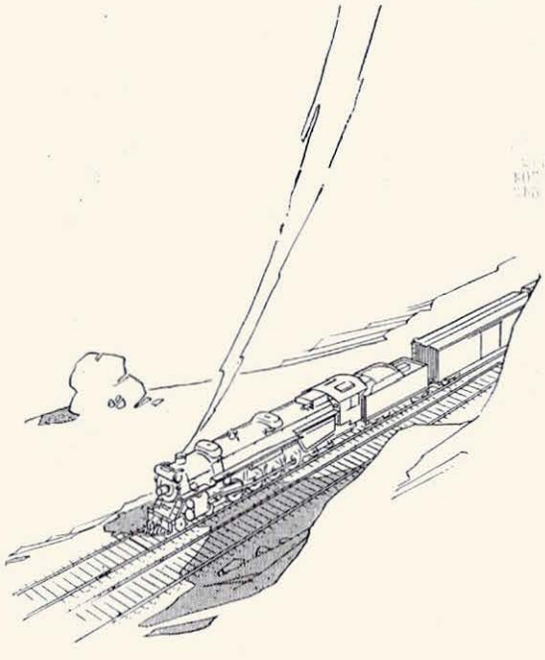
Now . . . Oil, Steel and Boiler Plants

Call on American Arch Company Engineers



FOR 21 YEARS, railroads have been putting their locomotive combustion problems up to American Arch Company. Locomotive Arches have been a special province of its engineers and service men.

But other industries, too, have brought their problems to American Arch Company. As a result, heating furnace and oil still roofs; boiler arches and air-cooled side walls have been developed until today American Arch Company is known throughout industry for its work on combustion problems.

This is of benefit to the railroads, for in its continuous research and development of locomotive Arches, American Arch Company can bring to bear a broad experience gained in serving all industry.

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NEW YORK CHICAGO

committees anticipate small changes or no change at all.

I. C. C. To Investigate Use of Trucks in Chicago Terminal Service

While many people are still wondering why the railroads have not rushed more rapidly into the use of motor trucks as substitutes for their own facilities, the Interstate Commerce Commission, on September 14, on its own motion, suspended for seven months, pending an investigation, tariff schedules filed by C. W. Galligan as agent for the Chicago railroads, which were to have become effective on September 15, proposing to establish optional truck service in lieu of rail service in moving l.c.l. freight from station to station in the Chicago district. The tariff provision reads as follows: "Transfer of freight between freight houses in the Chicago district may be performed by rail switching service or by highway vehicle service at the option of the road-haul carrier directly involved."

It is understood that the commission desires to inquire into several phases of the legal questions involved in the use of motor vehicles by railways, under a law which does not yet recognize this form of transportation.

Air Passengers Also Decrease

Scheduled air transport lines operating in the United States and with extensions to Canada, the West Indies and Latin America, flew more than 20,000,000 miles and carried 193,651 passengers, 4,589,707 pounds of mail and 1,299,863 pounds of express during the first six months of 1931, according to the results of a survey just completed by the Aeronautics Branch of the Department of Commerce.

The amount of mail carried represented an increase of more than half a million pounds over the first six months of 1930 and there also was an increase of 54,386 pounds in express shipments over the same period last year. Passenger traffic, however, showed a decrease of 14,706 passengers under the corresponding period in 1930.

The total number of miles flown in scheduled operations during the first half of 1931 represented an increase of 3,401,702 miles over the same period last year. However, the total passenger-miles flown showed a decrease, from 52,264,616 in the first half of 1930 to 47,501,901 in the first half of 1931.

New York to Washington in 4¼ Hours

Beginning with the new timetable which goes into effect on September 27, the Congressional Limited of the Pennsylvania, now running from New York to Washington in four hours, 25 minutes, will make the trip in four hours, 15 minutes; and the same time will be made northbound. The train southbound will leave New York at 4:30 p.m. and the extra fare, which has been charged on this train throughout its career, will be abolished.

Two new trains, each just like the Congressional, will be added to the New York-Washington service; the "President," leaving New York at 9:30 a.m., and the "Representative," at 12:30 p.m., each running through in 4½ hours. There will be corresponding trains northbound. Faster schedules will also go into effect for the Red Arrow, between New York and Detroit; the Iron City Express between New York and Pittsburgh, and several other trains. The Rainbow will leave New York at 11:35 p.m. and reach Chicago at 7:25 the next day; 20 hours, 50 minutes.

The Pennsylvania in New England

The Pennsylvania Railroad, which was opened for business between Philadelphia and Pittsburgh in December, 1852, began to advertise in the Boston daily newspapers early in 1853, calling attention to its facilities as a carrier of freight and passengers to the West. In 1854, an office was opened at 54 Kilby street, Boston, the company's first off-line office.

These and other interesting bits of history were given by George D. Ogden, recently appointed New England representative of the road, and probably the first off-line traffic officer to have the title of vice-president, in a brief address at a dinner of Boston traffic men on September 10.

The Pennsylvania's interest in New England has grown steadily during these 79 years. Through passenger service, without change of cars, between Boston and Washington was established in 1876, the cars being transferred across New York Bay on a steamboat. This became an all-rail route in 1917, on the completion of the Hell Gate bridge.

The Pennsylvania intends not only to maintain a closer contact with New England shippers, but also to become a greater consumer of New England products.

Grain Shipments Start Via Hudson Bay

There is considerable interest at Ottawa and in the prairie provinces over the two test grain shipments from Fort Churchill on Hudson Bay this week. Two boats, the Farnworth and the Warkworth, sister boats owned in Newcastle, Eng., with a carrying capacity of about 7,600 tons each, are at that port now to load wheat in tests undertaken by the Canadian government. They will take out of Hudson Bay an aggregate of about 500,000 bushels. Three cabinet ministers went up to Churchill to see the test, Hon. Robert J. Manion, Minister of Railways, Hon. Thomas Murphy, Minister of the Interior, and Hon. Robert Weir, Minister of Agriculture. Their trip from Ottawa to the remote Hudson Bay port occupies five days—two to Winnipeg and three from there to Churchill via The Pas, Man., over the Hudson Bay Railway. Col. A. E. Dubuc, chief engineer of the railway department, and David W. McLachlan of the same department, also went up to inspect harbor facilities there. It is estimated from a study of ice conditions in Hudson Straits that the navigation season, so far as autumn movement of crop is concerned, is only about two months, but provision is being made there to compensate for the short season by the maximum handling and loading facilities. Between the large mineral areas in northern Manitoba opened by the Hudson Bay Railway and the grain which the prairie growers think they can ship over this road it is hoped to derive a substantial revenue from the road and from the harbor facilities provided by the federal government at Churchill.

While that big project is now getting into operation the efforts of the railway owned and operated by the Ontario government, the Temiskaming & Northern Ontario, has only recently got its James Bay terminus established, and last week a special train left North Bay for Moose Harbor carrying officers of the Canadian Pacific and Canadian National to see this latest terminus on Hudson Bay Tidewater.

Equipment and Supplies

LOCOMOTIVES

THE MISSOURI PACIFIC has ordered one 30-ton gasoline-driven locomotive from the Plymouth Locomotive Works.

FREIGHT CARS

THE UNITED STATES NAVY DEPARTMENT is inquiring for three flat cars of 40 tons' capacity and is asking for prices on the repair of eight flat cars.

IRON & STEEL

THE CHESAPEAKE & OHIO is inquiring for 30,000 tons of rail.

THE LOUISVILLE & NASHVILLE is expected to enter the market for 50,000 tons of rail.

THE MISSOURI PACIFIC has ordered 200 tons of structural steel for grade separation work in Kansas City, Mo., from the Kansas City Structural Steel Company.

THE NORTHERN PACIFIC has ordered 200 tons of structural steel for a bridge over the Duwamish river near Seattle, Wash., from the Pacific Coast Steel Company.

THE GRAND TRUNK has ordered 220 tons of structural steel for grade separation work at Thirty-third and Thirty-fourth avenues, Detroit, Mich., from the McClintic-Marshall Corporation.

THE NEW YORK CENTRAL will receive bids until 12 o'clock noon, September 30, at the office of C. C. Warne, purchasing agent, New York, for its requirements of steel bars, steel shapes, steel plates, etc., for the fourth quarter of 1931.

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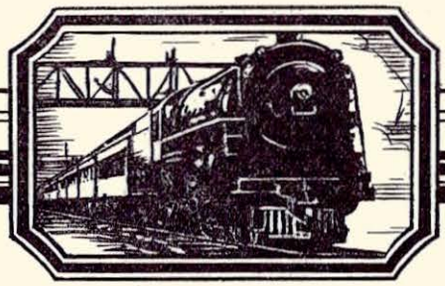

Alco Alco

TO ECONOMIZE— MODERNIZE

During the year 1920, 24½ per cent of the locomotives on Class I lines were reported as unserviceable. In 1921 and 1922 this percentage remained practically the same. However, starting with 1923 strenuous efforts to improve this condition began to show definite results. By 1929 this percentage had been reduced to 16.4. And the last report of the condition of motive power showed that on July 1st, 1931, only 10.9 per cent of the number of locomotives on line were in need of classified repairs.

But, is this true economy?

Isn't it true that when a machine reaches a certain stage of obsolescence of design it should be discarded regardless of the fact that it could still be put in condition to operate?

Our most outstanding industrial successes today quickly scrapped equipment of obsolete design—sometimes even before the shine was worn off.

They knew they were investing in greater future profits and greater competitive advantages.

It paid them—why wouldn't the same policy pay our railroads?

American Locomotive Company
30 Church Street New York N.Y.

Alco Alco

Supply Trade

H. S. Strouse, former advertising manager of the **Harnischfeger Corporation,** Milwaukee, Wis., has been elected treasurer.

The Verona Tool Works, with main office at Pittsburgh, Pa., has changed its name to the **Oakmont Forgings Company,** after selling its physical assets to the Woodings-Verona Tool Works.

The Pennsylvania Pump & Compressor Company, Easton, Pa., has formed a connection with **Byer Engineering Associates,** of the same city, with branch offices at 136 Liberty street, New York, and 1328 Chestnut street, Philadelphia, Pa.

The Hopkins-Benedict Company, Chicago, has taken over the distribution, factory sales and service of the **Portable Power Tool Corporation,** Warsaw, Ind., for all railroads in the United States. **Harry D. Stops** has been elected vice-president and treasurer and **A. C. Thom** has been appointed sales and service engineer of the former company.

The general headquarters of **Safety Refrigeration, Inc.,** will be moved on October 1 from New York to the Railway Exchange building, 80 East Jackson boulevard, Chicago. This will include the offices of **Horace M. Wigney,** manager, now located at 75 West street, New York, and **J. H. Michaeli,** superintendent of transportation, now located at New Haven, Conn. Safety Refrigeration has just closed the third year of its operation, and during that period has transported over 55,000,000 lb. of perishables. Safety iceless refrigerator cars including Safety protective service against heat or cold have now been contracted for by more than 20 railroads in the United States.

William A. Irvin, vice-president in charge of plant operation of the American Sheet & Tin Plate Company, who has been elected a vice-president of the **United States Steel Corporation,** in connection with manufacturing operations, with headquarters at New York, was born at Indiana, Pa., and was educated in the public schools and the night courses of the Indiana State Normal School. In 1888, he served as a telegraph operator on the Pennsylvania and later as clerk and assistant freight and ticket agent at Indiana. He went in 1895 as a shipping clerk to the P. H. Laufmann Company, Ltd., Apollo, Pa., sheet and tin plate manufacturers, and later held various positions until he became superintendent. When this company was taken over in 1900 by the American Sheet Steel Company, he served in the general offices of the latter company, and in 1904, when it was merged into the American Sheet & Tin Plate Company, he went to Pittsburgh as assistant to the operating vice-president of the new company. From November, 1925, until his recent election as a vice-president of the United States Steel Corporation, Mr. Irvin has served as

William A. Irvin

vice-president in charge of plant operations of the American Sheet & Tin Plate Company.

Harrison Hoblitzelle, who has been elected president of the **General Steel Castings Corporation,** Eddystone, Pa., was born on October 17, 1896, at St. Louis, Mo., and was graduated from Smith Academy, St. Louis, in 1913, and from Cornell University in 1917, with the degree of A.B. He began work on November 5, 1917, with the Commonwealth Steel Company, Granite City, Ill. He was appointed assistant purchasing agent in January, 1919, and manager of purchases and assistant treasurer in December, 1922. He was elected vice-president and manager of purchases in November, 1926, and in January, 1929, became vice-president and manager of sales. Following negotiations, in which he took part, which resulted in the Commonwealth Steel Company becoming a part of the General Steel Castings Corporation, in July, 1929, Mr. Hoblitzelle became vice-president and general manager of the Western, or Commonwealth, division of the latter corporation. On June 1, 1931, he was elected executive vice-president, which position he held at the time of his recent election as president of the same corporation. He is a director of this corporation and of several companies not affiliated with the steel industry.

Harrison Hoblitzelle

H. E. Chilcoat, manager of sales of the air dump car division of the **Koppel Industrial Car & Equipment Company,** Koppel, Pa., has been appointed general manager of sales, with headquarters at Koppel. Mr. Chilcoat was born at Orbinsonia, Pa. He served a machinist apprenticeship with the Pennsylvania and two years after the completion of this course entered the employ of the Westinghouse Air Brake Company, where he remained for 13 years, first as a mechanical expert at Richmond, Va., and later as commercial representative at Pittsburgh, Pa. In 1918 he left that company to go with the Clark Car Company as general manager, remaining in that position until 1926. During the next two and one-half years he was engaged in special consulting commercial engineering work, and since October 1, 1928, has served with the Koppel Industrial Car & Equipment Company as manager of sales of the air dump car division, which position he held until his recent appointment as general manager of sales of the same company.

H. E. Chilcoat

OBITUARY

Wallace McCausland, general manager of sales of the Reading-Pratt & Cady Company, Inc., Bridgeport, Conn., died on September 4.

G. A. Orth, chief, safety and claim department of the American Car & Foundry Company, New York, died on September 12 at his home, Maplewood, N. J., at the age of 53. Mr. Orth had served with the American Car & Foundry Company for 20 years, and organized the safety first campaign in all the plants of the American Car & Foundry Company. He was the author of many papers on safety delivered at conventions and had served on several commit-

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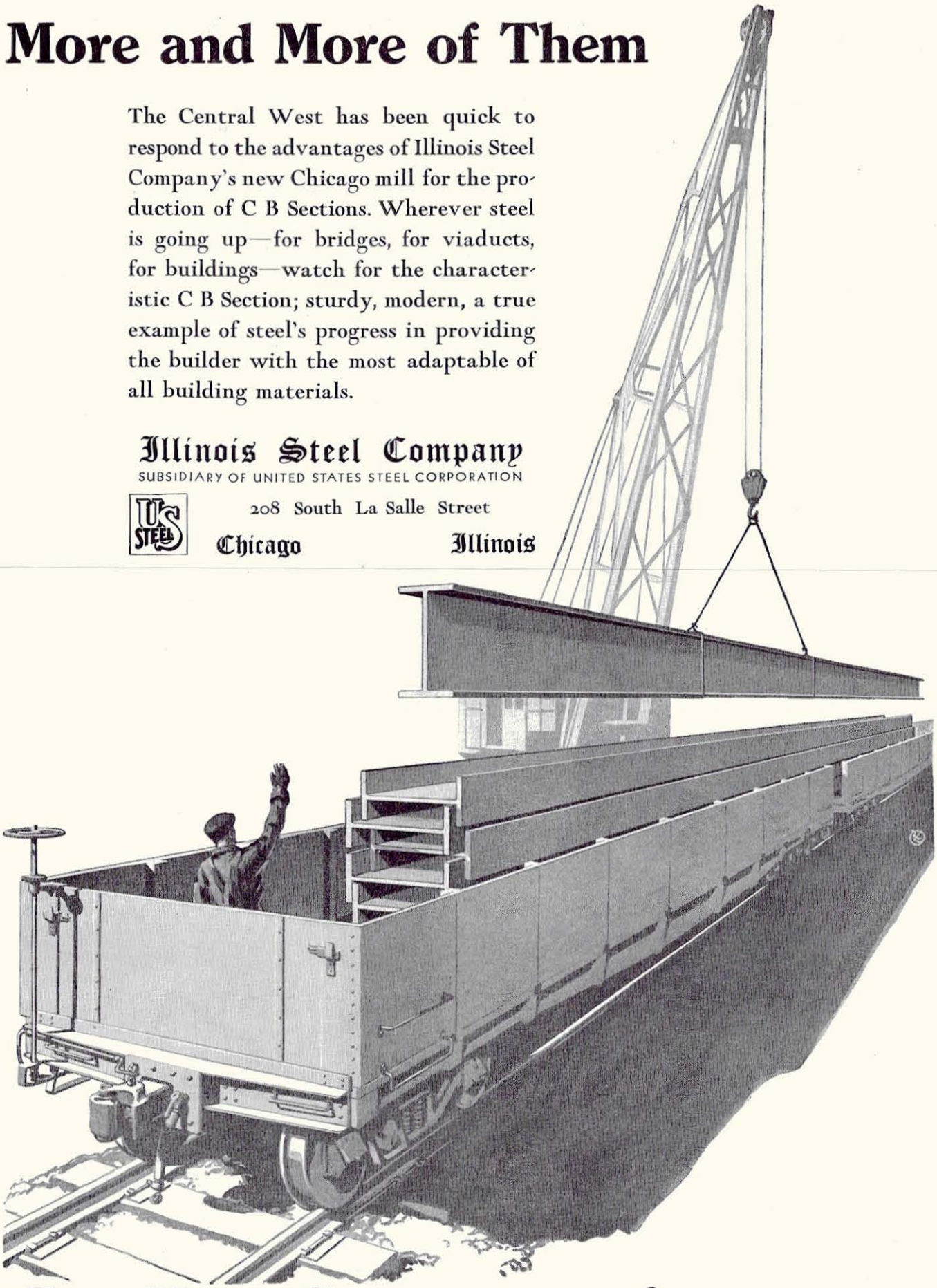
More and More of Them

The Central West has been quick to respond to the advantages of Illinois Steel Company's new Chicago mill for the production of C B Sections. Wherever steel is going up—for bridges, for viaducts, for buildings—watch for the characteristic C B Section; sturdy, modern, a true example of steel's progress in providing the builder with the most adaptable of all building materials.

Illinois Steel Company
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

208 South La Salle Street
Chicago Illinois



C B Sections

tees of the American Society of Safety Engineers.

Van Ness DeLamater, of the Hyatt Roller Bearing Company, Newark, N. J., and his son, 23 years old, who were vacationing in the Canadian woods, have been missing since August 29, when they started from a camp on an island in Green Lake, Algonquin National Park, Ontario, on a canoe trip. A search was instituted, but without success. An upturned canoe found on the shore, and information that a freakish storm struck the lake while the men were presumably on it, precluded the possibility that they might be lost in the woods. Mr. DeLamater had been associated with the Hyatt Roller Bearing Company since 1915, first as a member of the motor bearings division in Detroit, and for the past several years as sales engineer located at the plant office in Newark, specializing in railroad bearing applications.

Dr. Harry Phillips Davis, vice-president and director of the Westinghouse Electric & Manufacturing Company, died at his home in Pittsburgh, Pa., on September 10, after an illness of several months following an operation. For more than 21 of the 40 years during which he was connected with the Westinghouse Company, Dr. Davis was in charge of the company's enginering department, and for 15 years directed its engineering and manufacturing operations. Among his early achievements was his work on the electrification of the New York, New Haven & Hartford. He was a dominating factor in all phases of this electrification, as well as of others that followed, while almost 80 patents were issued to him for his development of electrical apparatus. Dr. Davis was also active in the development of every phase of radio, and was one of its foremost guiding spirits, being largely responsible for starting the first broadcasting station, KDKA. He was born at Somersworth, N. H., in 1868, and was graduated from the Worcester Polytechnic Institute with the degree of Bachelor of Science in Engineering. In 1891, he joined the detail engineering department of the Westinghouse Company. Five years later he was given charge of this department and in 1904 was made manager of the company's engineering department. In 1911 he was elected a vice-president. Dr. Davis was also connected with a number of other corporations as a director, and was chairman of the National Broadcasting Company.

TRADE PUBLICATION

42-B Electric Shovel.—The Bucyrus-Erie Company, South Milwaukee, Wis., has issued a 20-page bulletin devoted to an exposition of its new 42-B electric shovel, which is designed for use with a 1½-yd. dipper and is also available as a dragline and clamshell and lifting machine. The component parts of the equipment are adequately illustrated.

Construction

New York Central.—Contracts have been awarded by this company to the Walsh Construction Company, Syracuse, N. Y., for the reconstruction of bridge 431, Fort Plain, N. Y.; to William M. Ballard, Inc., Syracuse, for the elimination of a grade crossing at Mapleview, N. Y.; to H. H. Sherwin & Company, Inc., New York, for the construction of city sewers in New York City, and to the Meehan Paving & Construction Company, Inc., New York, for paving at Thirtieth Street yard, New York.

Port of New York Authority.—Four bids, of which the lowest was $7,591,000, for the construction of the superstructure of its new union inland freight terminal on Manhattan Island were opened by the Port of New York Authority on September 11. The various bids were submitted by the Turner Construction Company, James Stewart & Company, Inc., George A. Fuller Company and John T. Brady & Company, all of New York, while the amounts of all bids are low enough to ensure completion of the building within the $16,000,000 limit set by the Port Authority. It is expected that the superstructure contract will be awarded prior to October 1, by which time the foundation contract, awarded last spring to the Godwin Construction Company of New York (see *Railway Age,* April 11, page 741), will have been completed.

As the Port Authority has entered into an agreement with all trunk line railroads entering New York, as reported in the *Railway Age* of January 10, page 160, whereby it undertakes to turn over certain portions of the basement and ground floor of the terminal for railroad occupancy by May 1, 1932, the contractor will be required to complete such parts of the building on or before April 30. On or before August 31, 1932, he will be compelled under the specifications to complete the entire basement floor area; all ramps to the second floor; the installation of eight railroad elevators, and various other items, while he will have to finish the entire building on or before November 30, 1932. Standing on the block bounded by Eighth and Ninth avenues and West Fifteenth and Sixteenth streets, the new terminal will be the largest building in New York in cubical content, while an average of 1,000 men will be employed during the entire period of its construction.

Rutland.—This company has awarded to Lord & Humphrey, Malone, N. Y., a contract for the reconstruction of overpass bridge No. 335, 1.5 miles east of Chateaugay, N. Y., at an approximate cost of $36,500.

The Railway Club of Pittsburgh (Pa.) will hold its next meeting at the Fort Pitt Hotel, Pittsburgh, on Tuesday, September 24, at 7 p.m. Eastern standard time. Wm. Kromer, of the H. K. Porter Company, will present a paper on the place of the oil-electric locomotive in modern railway transportation.

Financial

Canadian National.—*Bonds.*—A syndicate headed by the Chase Harris Forbes Corporation, the Bancamerica-Blair Corporation and the First National Old Colony Corporation and comprising 33 other Canadian and U. S. banking houses has offered $50,000,000 of 4½ per cent, 20-year bonds of the company, guaranteed by the Dominion of Canada. The issue was priced at 98, to yield 4.65 per cent, in the United States and at 98½, to yield 4.61, in Canada.

Chicago, Milwaukee, St. Paul & Pacific.—*Abandonment.*—Examiner M. S. Jameson of the Interstate Commerce Commission has recommended in a proposed report that the commission authorize the abandonment of the line from Velasco, Wis., to Boulder Junction, 16.9 miles.

Chicago, Rock Island & Pacific.—*Passes Dividend.*—The directors of this company have omitted the quarterly dividend on the common stock. Last quarter $1 was paid. The period before the payment was $1.25. Previously the rate was $1.75, or $7 per annum.

Chicago, Rock Island & Pacific.—*Trackage Rights.*—This company has applied to the Interstate Commerce Commission for authority to operate over the line of the Davenport, Rock Island & Northwestern between Shaffton, Iowa, and Chancy, 7.83 miles, to build a connecting track, and to abandon its own line between those points.

Doniphan, Kensett & Searcy.—*Purchase.*—A hearing on the Missouri Pacific's petition for permission to acquire the Doniphan, Kensett & Searcy Railroad, a four-mile line running from Doniphan, Ark., to Searcy, by way of Kensett, was held at Little Rock, Ark., on September 9, by O. E. Sweet, director of the Bureau of Finance of the Interstate Commerce Commission. The application was opposed by the Missouri & North Arkansas, which parallels the Doniphan, Kensett & Searcy. Mr. Sweet gave the Missouri Pacific 30 days to file briefs, the Missouri & North Arkansas 15 days to make a reply and the Missouri Pacific another 15 days for rebuttal, after which the commission will announce its decision.

Great Northern.—*Trackage Rights.*—The Interstate Commerce Commission has authorized this company to operate under trackage rights over a line of the Southern Pacific in Klamath county, Ore., for a distance of approximately one mile, and to construct and operate about 1,000 ft. of track to connect its own line with that of the Southern Pacific. This authority eliminates the necessity for the construction of approximately one mile of new line by the Great Northern.

Groveton, Lufkin & Northern.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon, as to interstate and foreign

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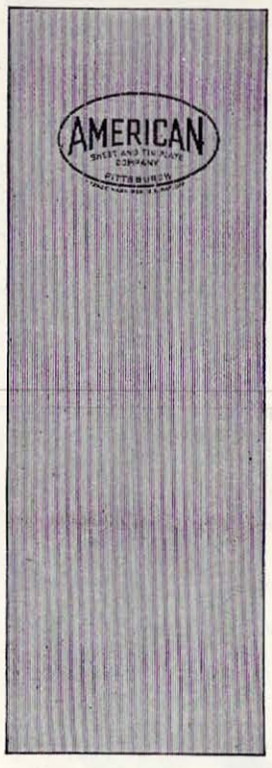
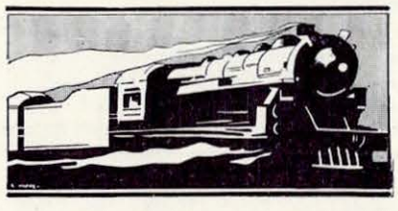
AMERICAN STEEL SHEETS



Serving All Fields of Transportation

For railway buildings, warehouses and car roofs; airport hangars, shops and sheds; traction line terminals and shelters; bus, truck, and automobile construction; factories and industrial buildings—and all uses for which sheet metals are found applicable.



AMERICAN Steel Sheets are adapted to every field of transportation, and are recognized for rendering service, reducing delays, and adding to travel and shipping greater reliability with safety. This reputation, gained in rigorous service, is a result of strict regard for quality and excellence in all processes of manufacture. These products capably meet all forms of service for which Steel Sheets are found suitable.

Supplied in Black and Galvanized Sheets; Locomotive Jacket Sheets, Keystone Rust Resisting Copper Steel Sheets, Galvannealed Sheets, Formed Roofing and Siding Products, Tin and Terne Plates, Special Sheets, and U S S Stainless and Heat Resisting Sheets and Light Plates.

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:

American Bridge Company
American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Columbia Steel Company
Cyclone Fence Company
Federal Shipb'ldg. & Dry Dock Co.
Illinois Steel Company
Minnesota Steel Company
National Tube Company
Oil Well Supply Company
The Lorain Steel Company
Tennessee Coal, Iron & Railroad Co.
Universal Atlas Cement Company

Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif.
Export Distributors—United States Steel Products Company, 30 Church Street, New York, N. Y.

commerce, operation of its line in Trinity county, Tex.

KANSAS CITY SOUTHERN.—*Passes Common Dividend.*—Although declaring the regular quarterly disbursement of $1 per share on preferred stock, the directors of this company have omitted dividend payments on the common stock. Common dividends were reduced last June from a quarterly rate of $1.25 per share to 50 cents per share, or from $5 to $2 a year.

LOUISVILLE & NASHVILLE.—*Bonds.*—J. P. Morgan & Co. are offering, subject to the approval of the Interstate Commerce Commission, $10,000,000 of ten-year 5 per cent secured gold bonds of this company, maturing in 1941. The issue is priced at 98 to yield 5.25 per cent.

MAINE CENTRAL.—*Passes Dividend.*—The directors of this company have omitted the quarterly dividend on the common stock. The payment was reduced from the customary $1.25 to 75 cents three months ago.

PANHANDLE & SANTA FE.—*Acquisition.*—This company has been authorized by the Interstate Commerce Commission to acquire control, by modified lease, of the Pecos River and of a part of the Pecos & Northern Texas.

PERE MARQUETTE.—*Protests Recapture Valuation.*—This company has filed with the Interstate Commerce Commission a protest against the tentative recapture report recently made public by the commission in which its net railway operating income in excess of 6 per cent on its valuation was placed at $1,641,025 for the years 1922, 1923 and 1925, on the basis of valuations ranging from $95,500,000 for 1920 to $111,500,000 for 1925. The company claims values ranging from $274,000,000 to $295,000,000, which it states were arrived at by giving effective weight to cost of reproduction less depreciation, whereas it contends that the commission's tentative figures result from the application of a mathematical formula, set forth in detail in an appendix, the principal feature of which is an averaging of the cost of reproduction and the estimated original cost, less an average of the depreciation as calculated on the two bases. This method, the protest states, is not in accordance with law and the values arrived at by it are declared to be insufficient and erroneous. The company asks that the tentative report be disapproved and withdrawn or that it be granted a hearing on its protest. The commission had ordered the company to pay $820,512 into its recapture fund unless protest was filed by a given date but the filing of the protest acts as a stay.

The Pere Marquette also makes the point that the commission's order, which is final in form and requires the carrier to pay one-half the aggregate amount determined to be recapturable, is void in that the commission has no authority in law to issue a final order upon a tentative recapture report. "It is apparent from the face of the report," the protest says, "that the findings therein made are tentative and are not intended to be conclusive, while the order purports to be final and conclusive."

PIGEON RIVER.—*Abandonment.*—This company has applied to the Interestate Commerce Commission for authority to abandon its line from West Canton, N. C., to Sunburst, 11.87 miles.

RIO GRANDE EASTERN.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon, as to interstate and foreign commerce, its entire line in Sandoval county, N. M.

SEABOARD AIR LINE.—*Abandonment.*—The receivers have applied to the Interstate Commerce Commission for authority to abandon the line from Andrews to Lanes, S. C., 18.95 miles.

SOUTHERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Moscow, Tenn., to Somerville, 13.14 miles.

ST. LOUIS & HANNIBAL.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Bowling Green, Mo., to Gilmore, 52.6 miles, on the ground that most of its traffic has been taken by trucks and busses.

WESTERN PACIFIC.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $645,000 additional first mortgage 5 per cent bonds, to be sold at not less than 97.5 and interest.

WESTERN PACIFIC.—*Trackage Rights.*—In connection with the construction of its Northern California extension, this company has been authorized by the Interstate Commerce Commission to operate under trackage rights over the Southern Pacific for a distance of approximately 5.27 miles through the town of Westwood, Cal., in lieu of construction and operation of approximately 6.38 miles of new line which would parallel the present Southern Pacific right-of-way.

Average Prices of Stocks and of Bonds

	Sept. 15	Last week	Last year
Average price of 20 representative railway stocks.	49.77	54.55	114.37
Average price of 20 representative railway bonds..	84.07	86.11	95.49

Dividends Declared

Chicago, North Shore & Milwaukee.—Prior Lien, $1.75, quarterly, payable October 1 to holders of record September 15.

Chicago, Rock Island & Pacific.—Common Dividend Omitted.

Mahoning Coal Railroad.—Common, $12.50, payable November 2 to holders of record October 15.

Maine Central—Common Dividend Omitted.

New York Central.—1 per cent, quarterly, payable November 2 to holders of record October 2

Pittsburgh, Bessemer & Lake Erie.—Common, $.75, payable October 1 to holders of record September 15.

Pittsburgh, Ft. Wayne & Chicago.—Common, 1¾ per cent, payable October 1 to holders of record September 10; Preferred, 1¾ per cent, payable October 6, to holders of record October 2.

Southern.—Preferred, 1¼ per cent, quarterly, payable October 15 to holders of record September 21.

Railway Officers

EXECUTIVE

C. R. McDonald, office assistant to the president of the Missouri-Kansas-Texas, has been appointed executive representative, with headquarters as before at St. Louis, Mo.

William W. Owens, general manager of the South Atlantic department of the Railway Express Agency, with headquarters at Washington, D. C., has been appointed vice-president, southern operating departments, with headquarters at Atlanta, Ga., succeeding **William G. Smith,** retired. Mr. Owens was born on October 11, 1876, at Cincinnati, Ohio, and received his education at the public schools in Cincinnati and St. Paul, Minn. He began his business career in September, 1892, with the Adams Express, and held various minor positions until he received a temporary appointment as route agent at Oskaloosa, Iowa. Later he undertook a position in the superintendent's office of the Great Northern Express Company at St. Paul, Minn., and after 18 months' service with that company he was advanced to chief clerk of the accounting department. Nearly five years later he was appointed chief clerk

W. W. Owens

of the traffic department; and he was next advanced to superintendent. On January 1, 1913, he commenced service with the Southern Express Company as superintendent at Chattanooga, Tenn., and exactly three years afterwards was appointed traffic manager. Fifteen months later he was advanced to second vice-president, a position he held when the consolidation of express traffic was effected by the formation of the American Railway Express Company on July 1, 1918. With the unification of the service on a national basis, Mr. Owens was appointed general manager of the then newly-created Southeastern department at Jacksonville, Fla. A re-arrangement of the southern operating territory

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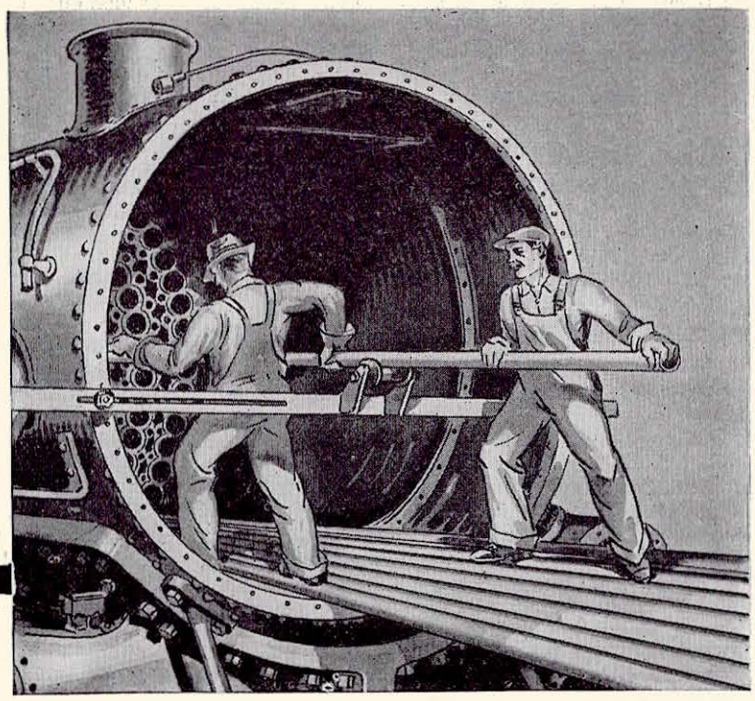
AGAIN



TONCAN IRON TUBES ...show prolonged life

BAD WATER causes the replacement of steel tubes every 12 months on a mid-western road. • After 26 months' service Toncan Iron tubes were removed, found to be in excellent condition and reapplied to a switcher for further service. • Toncan Iron tubes have the natural corrosion resistance of iron fortified by the inclusion of copper and molybdenum. • Not only will they resist corrosion and pitting but they are seamless and can be cold-worked without danger of subsequent fire-cracking. • Toncan Iron tubes are a contribution of modern metallurgy to the the reduction of locomotive maintenance.

REG. U. S. PAT. OFF.
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Mo-lyb-den-um
IRON

The Birdsboro Steel Foundry & Machine Company of Birdsboro, Penna., has manufactured and is prepared to supply under Toncan license, copper-molybdenum castings for the locomotive.

REPUBLIC STEEL CORPORATION
General Office: Youngstown, Ohio

was effected late in 1920, soon after the government returned the railroads to private management, and the South Atlantic department was created, with headquarters at Washington. Mr. Owens was transferred there as general manager on January 20, 1921, which position he held until his recent promotion.

FINANCIAL, LEGAL AND ACCOUNTING

Harry S. Maccubin, assistant auditor of merchandise receipts of the Baltimore & Ohio, at Baltimore, Md., retired on pension on September 15, after 50 years of service with that road.

Merle F. Harden, who was recently appointed comptroller of the Central of Georgia, as announced in the *Railway Age* of September 5, page 383, was born on September 20, 1879, at Ohio Pyle, Penn., and received a public school education. He entered railroad service in June, 1896, with the Southern, and served successively until 1901, as clerk, call boy, yard clerk, flagman, stenographer, and bill clerk. From 1901 to 1903, he served as station accountant with the Atlanta & West Point, at Atlanta. In the latter year he became connected with the Southern as traveling auditor, and held that position for three years. From 1906 to 1907, he served as station accountant for the Central of Georgia. In 1907, he reentered the service of the Atlanta & West Point as chief clerk to the disbursements and general accountant at Atlanta, Ga., and from January to April, 1912, he served as special accountant of the Illinois Central, at Chicago. Since April, 1912, he has been continuously in

Merle F. Harden

the service of the Central of Georgia, serving successively until April, 1915, as traveling auditor, chief traveling auditor and chief to comptroller; from 1915 to 1917 as cost accountant ,and from 1917 until 1918 as auditor of disbursements. During Federal control, 1918 to 1920, he was comptroller, and since 1920, when the railroads were returned to private management, he has served as auditor, which position he was holding at the time of his recent promotion.

OPERATING

H. E. Peterson has been appointed superintendent of organization of the Railway Express Agency, with headquarters at Chicago, to fill a position that has been vacant since April 1.

J. E. Henderson, trainmaster on the Chicago, Rock Island & Pacific, with headquarters at Haileyville, Okla., has been transferred to Herington, Kan., to succeed **C. C. Cunningham,** whose appointment as division engineer is noted elsewhere in these columns. The position of trainmaster at Haileyville has been abolished.

Following the abolition of the Akron division of the Pennsylvania and its consolidation with the Cleveland division, **R. H. Nowell,** trainmaster on the former division, has been appointed trainmaster on special duty on the Cleveland division, with headquarters as before at Akron, Ohio. **H. E. Gilg** and **E. C. Forester,** assistant trainmasters on the Akron division, have been appointed to like positions on the Cleveland division, the former at Akron and the latter at Orrville, Ohio.

H. A. Israel, assistant superintendent of the Illinois division of the Missouri Pacific, has been appointed trainmaster, with jurisdiction over the Illinois division and the Missouri-Illinois (unit of the Missouri Pacific) east of the Mississippi river, exclusive of the river transfer, with headquarters as before at Bush, Ill. **E. L. Kimmel** has been appointed trainmaster of the Missouri-Illinois in Missouri, including the river transfer, with headquarters at Bonne Terre, Mo. The position of assistant superintendent at Bush has been abolished.

Effective August 15, the Coster division of the Southern was consolidated with the Knoxville division, and **W. D. Post,** formerly superintendent, was appointed assistant superintendent of the Knoxville division, with headquarters at Knoxville, Tenn. The Norfolk division was consolidated with and will be operated as a portion of the Richmond division, and **R. L. Avery,** formerly superintendent, was appointed assistant superintendent, Richmond division, with headquarters at Norfolk, Va. The position of assistant superintendent of the Northern Alabama (part of the Southern), has been abolished and **O. K. Cameron** has been appointed trainmaster of that road, with headquarters at Sheffield, Ala. Effective August 1, the position of assistant superintendent, Asheville division of the Southern, was abolished, and **J. F. Gaffney** appointed trainmaster, with jurisdiction over the territory from Asheville to Murphy, including the Carolina & Tennessee Southern, with headquarters at Asheville, N. C.

William Egleston has been appointed general manager of the Railway Express Agency, with headquarters at Washington, D. C. He was born on December 2, 1875, in Shasta county, California, and received his education at the University of the South, Sewanee, Tenn., from which he was graduated in 1895. Mr. Egleston began his railroad career as a route agent with the Southern Express Company, and served in that capacity at Portsmouth, Ohio, Mobile, Ala., and Nashville, Tenn., successively, until 1907, when he was promoted to chief clerk to the vice-president, with headquarters at Atlanta, Ga. In 1908, he was appointed agent at Atlanta, and in 1910, superintendent at Norfolk, Va. Eight

William Egleston

years later he accepted a similar position with the American Railway Express Company at Norfolk. In 1929, he entered the service of the Railway Express Agency as superintendent at Norfolk, and later in that year he was advanced to general manager at Atlanta, Ga., which position he held until his recent appointment as general manager at Washington, D. C.

TRAFFIC

J. S. Coward has been appointed general agent for the Chicago Great Western at Spokane, Wash., to succeed **M. O. Culton,** who has resigned.

William K. Evans, manager of the division bureau of the Canadian National, at Montreal, Que., retired on September 11, after completing more than half a century of service in the freight department of the C. N. R. and its predecessors. The position which Mr. Evans occupied has been abolished.

R. T. DuBose, chief clerk to the general freight agent of the Missouri-Kansas-Texas of Texas, with headquarters at Dallas, Tex., has been promoted to assistant general freight agent at the same point, to succeed **S. D. Sparkes,** who has been promoted to general freight agent at Dallas. Mr. Sparkes succeeds **Harvey Allen,** who has been transferred to St. Louis, Mo., on the M-K-T.

Stuart A. Allen has been appointed assistant to the general freight traffic manager of the Baltimore & Ohio, with headquarters at Baltimore, Md., upon his return after a leave of absence because of ill health. Mr. Allen was born

Continued on Next Left Hand Page

BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

at Oral Oaks, Va., on January 18, 1872, and was educated at the United States Military Academy, West Point, N. Y. His first railroad position was with the Savannah, Florida & Western (now part of the Atlantic Coast Line), at Gainesville, Fla., and until 1896 he held various positions consecutively with the Savannah, Americus & Montgomery (now part of the Seaboard Air Line), the Central of Georgia, and the Knoxville, Cumberland Gap & Louisville (now part of the Southern), at various points in the southeastern states. In 1896, he became traveling freight agent on the Cincinanti, Hamilton & Dayton (now part of the Baltimore & Ohio), with headquarters at Cincinnati, Ohio. He was promoted

Stuart A. Allen

to general agent on the same road in 1898, and in 1899 became general southern agent of the Hoosac Tunnel Line at Cincinnati and Memphis, holding this position until 1903, when he resumed his connection with the C. H. & D., as general southern agent, with headquarters as before at Cincinnati. In 1908, he was promoted to assistant general freight agent, and, in 1910, he became general agent, freight department, of the Baltimore & Ohio, at Cincinnati. In 1914, he became general manager, Baltimore & Ohio Fast Freight Line (Continental Lines and Central States Despatch). He was promoted to general eastern freight agent on the Baltimore & Ohio and transferred to New York in 1916, and in 1917 he was appointed general freight agent, with the same headquarters. In 1920, he became assistant freight traffic manager, which position he held until March, 1921, when he was advanced to freight traffic manager at Chicago.

ENGINEERING AND SIGNALING

J. V. Neubert, chief engineer maintenance of way of the New York Central, with headquarters at New York, has been appointed also to the same position on the Michigan Central and the Cleveland, Cincinnati, Chicago & St. Louis.

C. C. Cunningham, trainmaster on the Chicago, Rock Island & Pacific, with headquarters at Herington, Kan., has been appointed division engineer at the same point to succeed **H. M. Long,** who has been transferred to Kansas City, Mo. Mr. Long replaces **J. T. Fitzgerald,** who has been assigned to other duties.

C. E. Cherry, assistant division engineer on the Missouri Pacific, with headquarters at Pueblo, Colo., has been promoted to division engineer of the Illinois division and of the Missouri-Illinois (unit of the Missouri Pacific) east of the Mississippi river, exclusive of the river transfer, with headquarters at Bush, Ill., taking over the duties of division engineer at Bush, formerly assigned to **H. A. Israel,** assistant superintendent, who has been appointed trainmaster, with the same headquarters, as noted elsewhere in this issue of *Railway Age*. The position of assistant division engineer at Pueblo has been left vacant temporarily. **J. R. Nagel,** division enginer at St. Louis, Mo., has had his jurisdiction extended to include the Missouri-Illinois west of the Mississippi river, including the river transfer.

MECHANICAL

W. H. Halsey, master mechanic on the Iowa division of the Chicago & North Western, with headquarters at Boone, Iowa, has been appointed master mechanic of the Western Lines, with headquarters at Chadron, Neb., where he will have jurisdiction over the Eastern, Black Hills, and Wyoming divisions and that part of the Dakota division between Pierre, S. D., and Rapid City. **H. H. Thurber,** master mechanic at Chadron, has been assigned to other duties. **J. B. Moore,** master mechanic of the Northern Iowa division, with headquarters at Belle Plaine, Iowa, has been transferred to the Peninsula division, with headquarters at Escanaba, Mich., to succeed **Otto J. Protz,** who has been appointed assistant master mechanic of the Iowa, Northern Iowa and Sioux City divisions, with headquarters at Clinton, Iowa. **W. S. Whitford,** master mechanic on the Iowa division, with headquarters at Clinton, Iowa, has been appointed master mechanic of the Iowa, Northern Iowa and Sioux City divisions, with headquarters at Boone. **J. W. Anderson,** master mechanic of the Minnesota division, which has recently been combined with the Madison and Dakota divisions, has been appointed master mechanic of the Dakota division (except from Pierre to Rapid City), with headquarters at Winona, Minn. He also has jurisdiction over the Winona shops and the Madison division from Winona to Waseca, Minn. **G. S. King,** master mechanic of the Dakota division, has been appointed assistant master mechanic of that division, excepting the territory west of Pierre, with headquarters as before at Huron, S. D.

OBITUARY

S. M. Dutton, formerly division superintendent of the Seaboard Air Line, with headquarters at Savannah, Ga., died on September 13.

Albert E. Carlton, president of the Cripple Creek Central, with headquarters at Colorado Springs, Colo., died on September 7 at the age of 66.

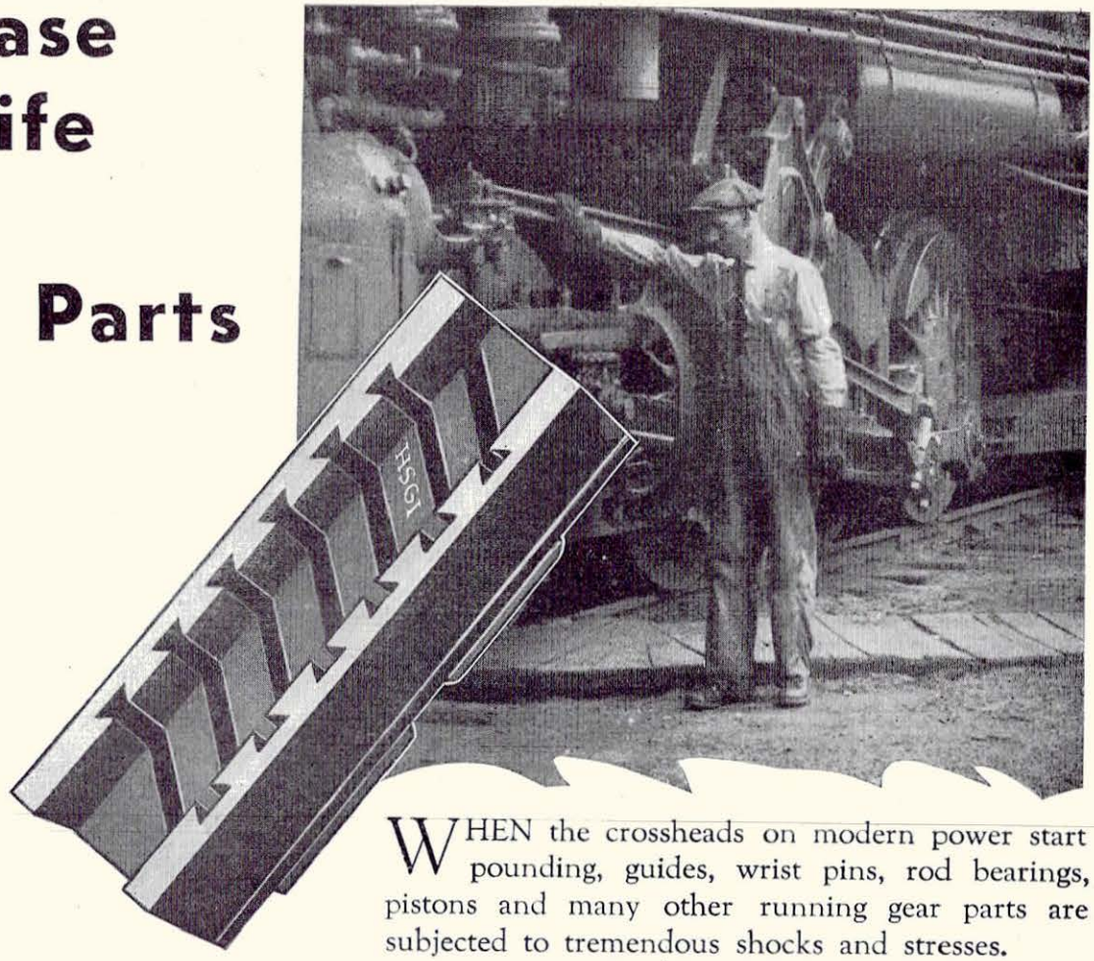
William Bretschneider, assistant division engineer of the Houston division of the Southern Pacific Lines in Texas and Louisiana, with headquarters at Houston, Tex., died on August 4.

Stanley M. Braden, who retired in 1922 as general superintendent of the Chicago & North Western, lines west of the Missouri river, died on September 12 at his home in Pasadena, Cal., where he had resided since his retirement.

Walter Thayer, formerly coal traffic manager of the Pennsylvania, was sticken by heart disease on September 11, and died shortly after he was removed to Bryn Mawr Hospital, Philadelphia, Pa. Mr. Thayer was born on April 27, 1874, and received his education at Haverford School and the University of Pennsylvania. He undertook his first railroad position in 1895, as receiving clerk in the freight station of the Pennsylvania, and has been connected with that road and its subsidiary companies during the greater part of his railway career. From 1924, until his resignation last spring, Mr. Thayer had served as coal traffic manager.

A. R. Ponder, executive assistant to vice-president of the Missouri Pacific Lines and vice-president of the San Antonio, Uvalde & Gulf, with headquarters at San Antonio, Tex., died suddenly on September 10 at Asherton, Tex. Mr. Ponder had been in railway service for about 38 years. He was born on August 22, 1867, near Doniphan, Mo., and was educated at the Missouri School of Mines, Rolla, Mo. He entered railway service in 1893 as assistant chief engineer of the Cape Girardeau & Ft. Smith, and in 1894 went with the St. Louis, Kennett & Southern (now a part of the St. Louis-San Francisco), in the same capacity at Kennett, Mo. From 1898 until 1902, Mr. Ponder served successively as superintendent and general superintendent on the same road. On the latter date, he left railway service to become president of the Cape Girardeau Telephone Company, being appointed general manager of the Cape Girardeau Bell Telephone Company two years later. In 1909, Mr. Ponder became president of the Crystal City & Uvalde (now the S. A. U. & G.). He served this road as president and general manager and receiver and general manager until 1925, at which time it was acquired by the Missouri Pacific. On that date, he was appointed general manager, and from February to November, 1926, he served as superintendent of the San Antonio division of the M. P. From the latter date until his death, Mr. Ponder was executive assistant to vice-president of the M. P., with jurisdiction over the International-Great Northern and the Gulf Coast Lines, as well as vice-president of the S. A. U. & G.

Increase the Life of Many Parts



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It is obtained by returning the heat in a part of the exhaust steam to the boiler—heat that has already been paid for—that does not come from the firebox.

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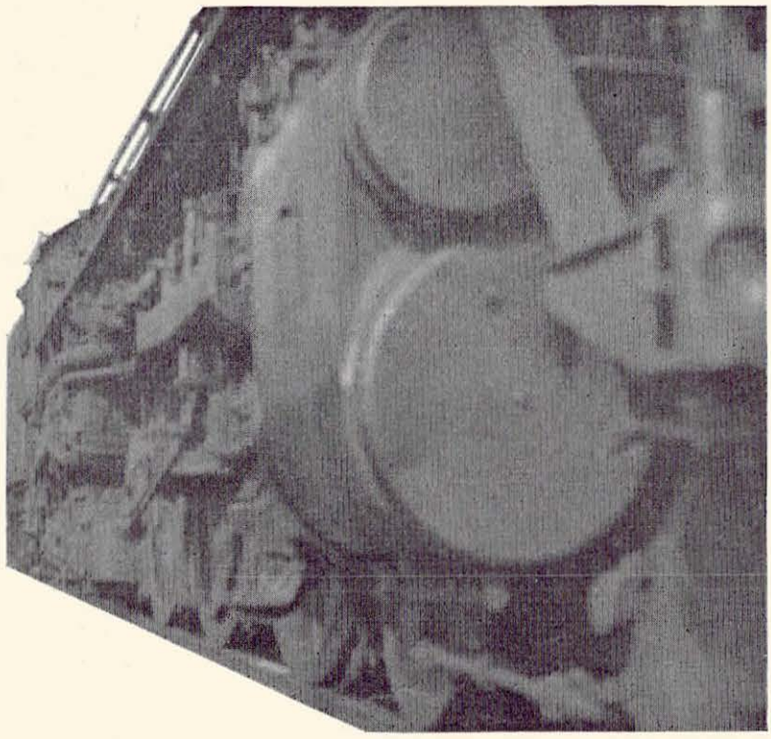
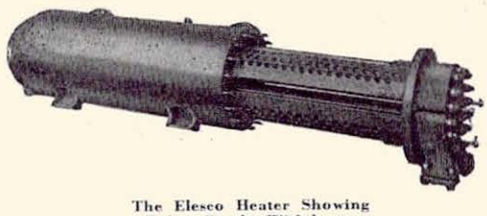
Consider what this would mean on your road. Can you afford to be without them any longer?





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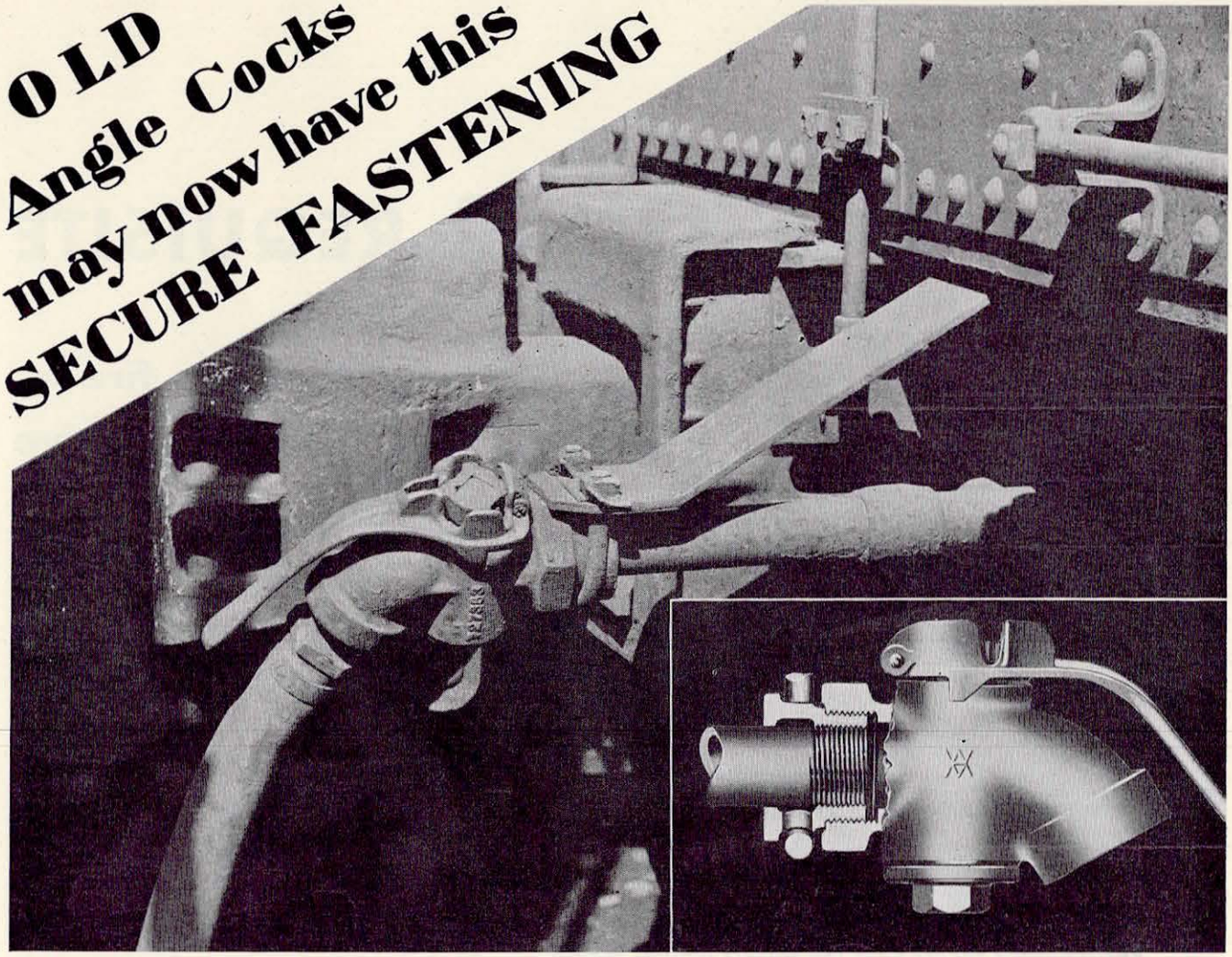
OLD Angle Cocks may now have this SECURE FASTENING



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Old angle cocks may have this feature added to them by inserting the bushing shown in the illustration . . . We suggest that all old standard angle cocks be converted by adding the bushing so as to obtain the recognized advantages of secure fastening—Complete information may be obtained by writing our nearest district office.

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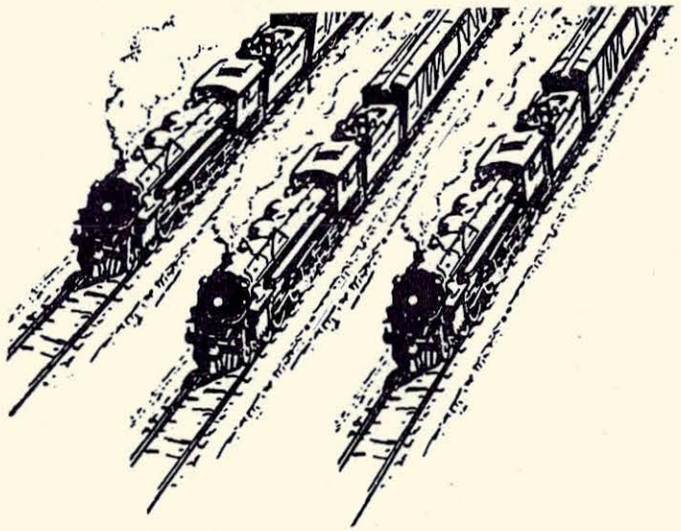

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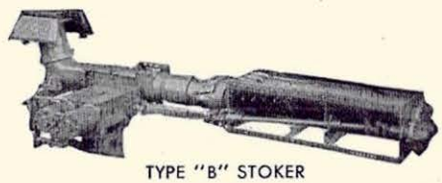
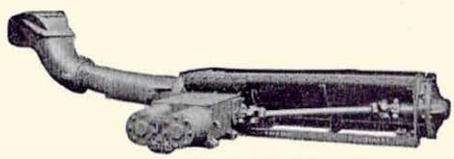
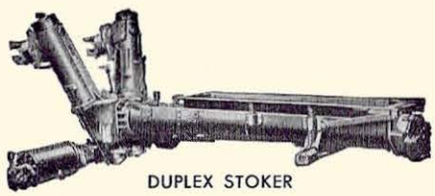


TYPE "B" STOKER



TYPE "B-K" STOKER



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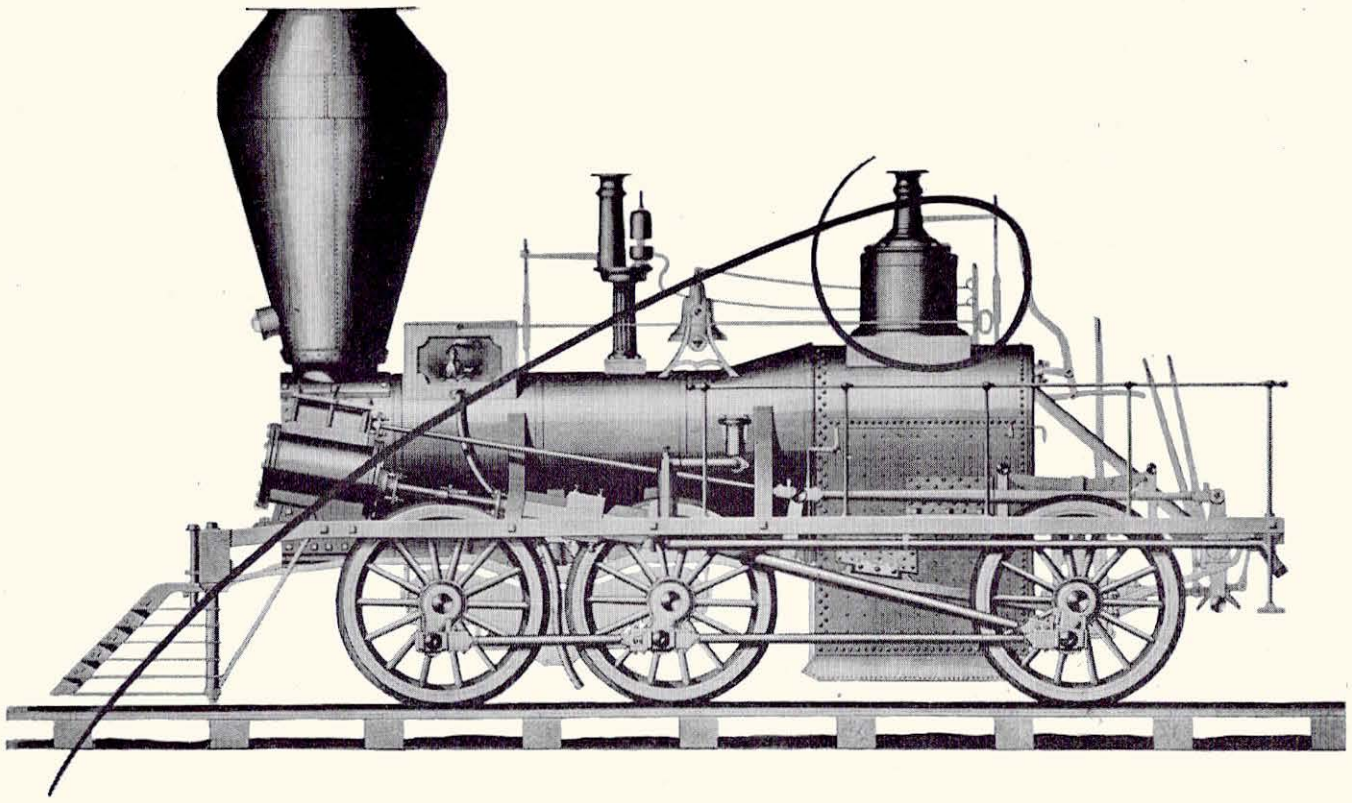

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it was the practice to install the throttle in the boiler, which was considered the best place for it. Early locomotives were comparatively small and steam space was easily provided.

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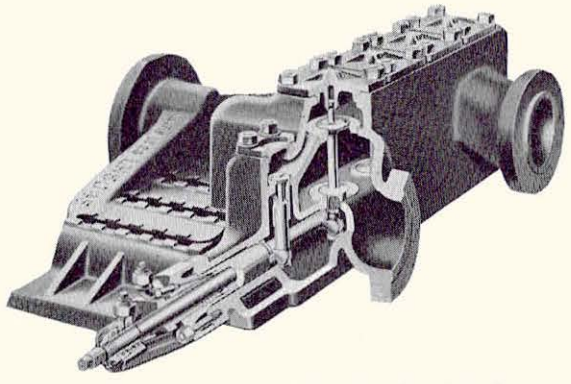

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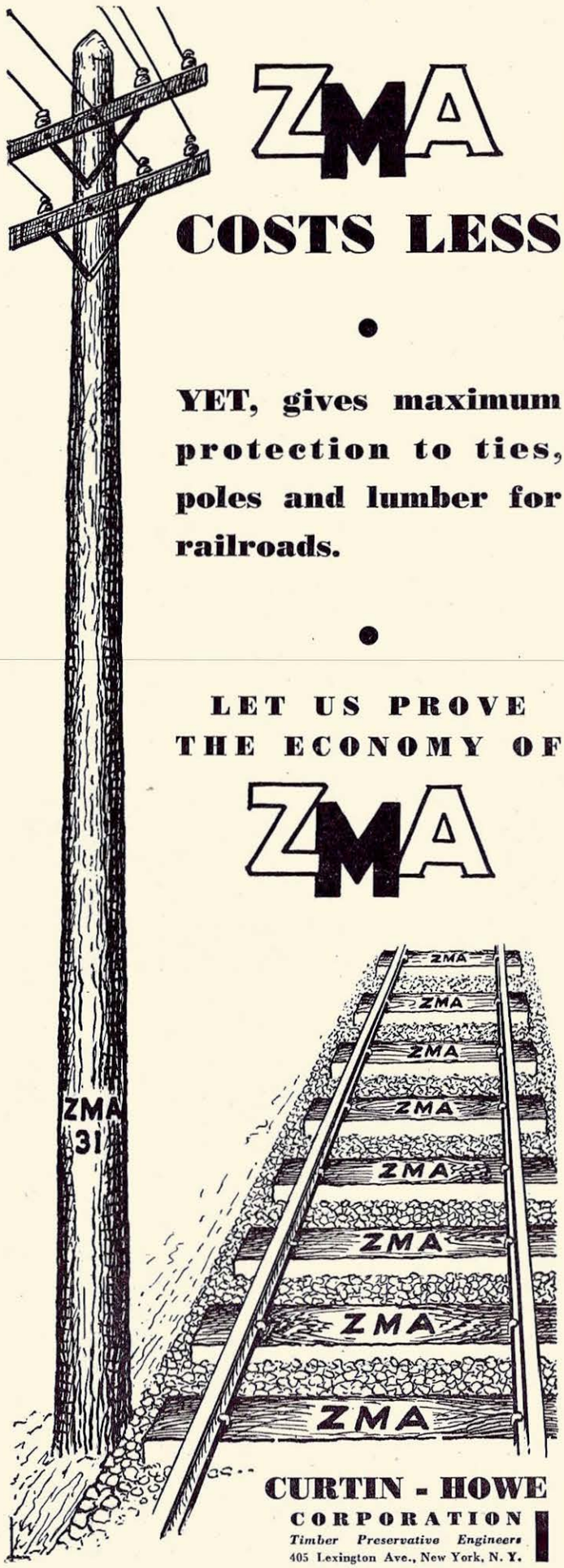

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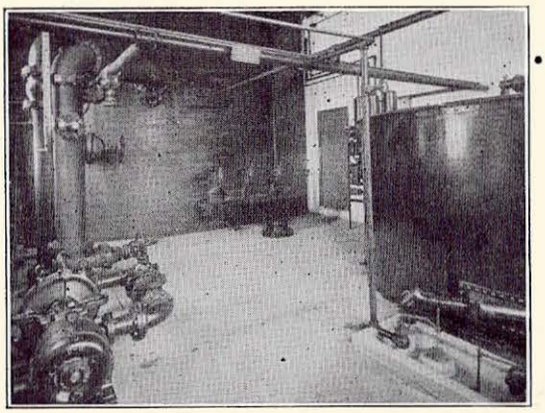

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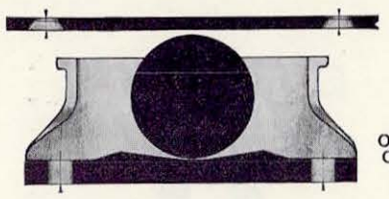

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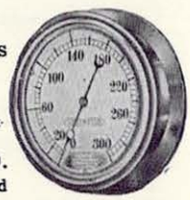

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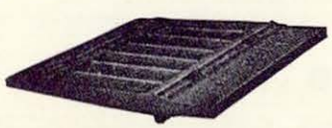
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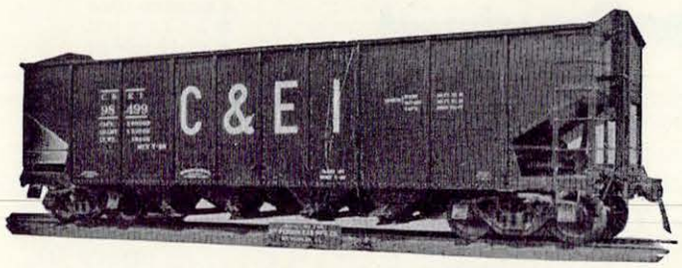

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For location of advertisements in this issue of manufacturers listed in the Buyers Index, see Advertisers Index on the last page next to cover

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Accounting Machines.
Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Air Brakes.
New York Air Brake Co.
Westinghouse Air Brake Co.

Aircraft Corrugated Sheet.
Aluminum Co. of America.

Aircraft Extruded & Rolled Shapes.
Aluminum Co. of America.

Aircraft Plates.
Aluminum Co. of America.

Aircraft Screw Machine Products.
Aluminum Co. of America.

Aircraft Streamline & Round Tubing.
Aluminum Co. of America.

Air Lifts.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
New York Air Brake Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp.

Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
Westinghouse Elec. & Mfg. Co.

Baggage Door Controller Device.
Edwards Co., O. M.

Barges, Steel.
American Bridge Co.

Barges, Treated.
Century Wood Preserving Co.
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National Lumber & Creosoting Co.

Bars, Concrete, Reinforcing.
Carnegie Steel Co.
Central Alloy Steel Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Bars, Iron and Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Illinois Steel Co.
Inland Steel Company.
Lockhart Iron & Steel Co.
McConway & Torley Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Bars, Rolled Steel.
Carnegie Steel Co.

Batteries, Lighting.
Electric Storage Battery Co.

Batteries, Starting.
Electric Storage Battery Co.

Batteries, Storage.
Electric Storage Battery Co.
Railroad Supply Co.
Safety Car Heating & Lighting Co.

Batteries, Wet Cell.
Electric Storage Battery Co.

Beams, Channel & Angle.
Carnegie Steel Co.
Illinois Steel Co.
Ryerson & Son, Inc., Joseph T.

Bearings, Axle Generator.
S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.
Symington Co., The.

Bearings, Journal.
Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Roller.
American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Miner, W. H.
Shafer Bearing Corp.
S. K. F. Industries, Inc.
Standard Car Truck Co.
Stucki Co., A.
Timken Roller Bearing Co.
Wine Railway Appliance Co.

Bearings, Roller Side.
Q. & C. Company, The.
Standard Coupler Co.
Stucki Co., A.

Bearings, Side.
American Steel Foundries.
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Beds, Cast Steel, Locomotive.
General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.
Prime Mfg. Co., The.

Bells, Highway Crossing.
Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

Bending and Straightening Machines.
Ryerson & Son, Jos. T.
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Billets, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
McConway & Torley Co.
Midvale Co., The.
Ryerson & Son, Jos. T.
Republic Steel Corp.
Standard Steel Works Co.

Blocks, Chain.
Barco Mfg. Co.

Blocks, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
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National Lumber & Creosoting Co.
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Blooms, Steel.
Carnegie Steel Co.
Republic Steel Corp.

Blower Fittings, Automatic Smokebox.
Barco Mfg. Co.

Blowers, Turbo.
Ingersoll-Rand Co.

Blowtorches, Acetylene.
Oxweld Railroad Service Co., The.

Boiler (all types).
Baldwin Locomotive Works, The.

Boiler Checks.
Prime Manufacturing Co., The.

Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

Bolsters, Steel.
American Steel Foundries.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
Mt. Vernon Car Mfg. Co.
Ohio Steel Foundry Co., The
Pressed Steel Car Co.
Symington & Son, Inc., T. H.

Bolts and Nuts.
Baldwin Locomotive Works, The
Bethlehem Steel Co.
Buffalo Brake Beam Co.
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Neely Nut & Bolt Co.
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Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Bolts & Nuts, Monel Metal.
International Nickel Co., The.

Bolts, Patch.
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Bolts, Track.
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Bonders, Rail.
Q & C Co., The.

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Ingersoll-Rand Co.

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Bonds, Signal.
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Bond, Wire Protection.
P & M Co., The.

Boosters, Locomotives.
Franklin Railway Supply Co., Inc.

Boring & Drilling Machines, Horizontal.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Boring Machines, Car Wheel
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Horizontal.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Vertical.
Sellers & Co., Inc., Wm.

Braces, Rail
Bettendorf Co., The.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
Q & C Co., The.
Ramapo Ajax Co.
Symington Co., The.

Brake Beam Safety Guards.
Buffalo Brake Beam Co.
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Brill Co., The J. G.
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Hunt-Spiller Mfg. Corp.

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American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Davis Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Schaefer Equipment Co.

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National Brake Co.

Brake Heads.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
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National Malleable & Steel Castings Co.
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American Brake Shoe & Foundry Co.
American Steel Foundries.
Brill Co., The J. G.
Buckeye Steel Castings Co.
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General Electric Co.
New York Air Brake Co.
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Brakes, Clasp.
American Steel Foundries.

Brakes, Electric.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Hand.
Miner, W. H.
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Carey Co., The, Philip.

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Bridge Stringers — (See Stringers, Bridge).

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Aluminum Co. of America.

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Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

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American Bridge Co.
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Milwaukee Electric Crane & Hoist Corp.
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Edgewater Steel Co.
Miner, W. H.
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Westinghouse Air Brake Co.

Buffers, Radial.
Franklin Railway Supply Co., Inc.

Building Materials.
Carey & Co., Philip, The.
Johns-Manville Corp.

Buildings, Iron, Steel and Steel Concrete.
American Bridge Co.
United Engineers & Constructors, Inc.

Bulldozers.
Ryerson & Son, Joseph T.

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Reo Motor Car Co.

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Locomotive Finished Material Co.

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Graybar Electric Co.

Cables, Electric.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
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Cableways—(See Tramways).

Caps, Grease.
Prime Mfg. Co., The.

Carbide, Calcium.
Oxweld Railroad Service Co.

Car Insulation.
Carey & Co., Philip, The.
Wood Conversion Co.

Car Lighting Equipment—(See Lighting, Car Equipment).

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

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General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
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Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding — (See Siding, Car, etc.).

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Brill Co., The J. G.
Pressed Steel Car Co.
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Bettendorf Co., The.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
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Bettendorf Co., The.
Pressed Steel Car Co.
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Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

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Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Pressed Steel Car Co.

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General American Tank Car Corp.
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General American Tank Car Co.
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Pressed Steel Car Co.

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Pressed Steel Car Co.
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General Electric Co.
Pullman Car & Mfg. Corp.
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Western Wheeled Scraper Co.

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Bethlehem Steel Co.
General American Tank Car Corp.
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Pressed Steel Car Co.

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Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The.
Dearborn Chemical Co
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
Q. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
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Cleaners, Bus & Truck.
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Cleaners, Car.
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Cleaners, Flue.
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Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
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Cocks, Cylinder.
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Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
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Compounds, Boiler.
Dearborn Chemical Co.
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Compounds, Cleaning.
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Compressors, Air.
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Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Electric Railweld Service Corp.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
Locomotive Finished Material Co.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.

Cylinders, Locomotive
Locomotive Finished Material Co.
Union Steel Casting Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co. The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic. Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries
Baldwin Locomotive Works The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
JohnsManville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Cuvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D. The.

Locomotives, Rebuilt.
American Locomotive Co.
Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotive Stokers.
Standard Stoker Co.
Locomotive Valve Pilot.
Valve Pilot Co.
Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.
Lubricators, Piston Rod.
Q & C Co., The.
Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.
Machine Screws, Monel Metal
International Nickel Co., The.
Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.
Mechanical Draft Apparatus—(See Heating and Vent. App.).
Mechanical Stokers.
Standard Stoker Co.
Melters, Snow, Electric.
Q & C Co., The.
Metallic Flexible Conduit.
General Electric Supply Corp.
Meters, Water & Oil.
Worthington Pump & Machinery Corp.
Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.
Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.
Milling Machines, Portable Frame Jaw.
Micro Machine Co.
Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Molybdenum Metal.
Vanadium Corp. of America.
Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.
Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.
Motors & Generators.
Fairbanks-Morse & Co.
Moulding.
Aluminum Co. of America.
Multiple V Belt Drives.
Worthington Pump & Machinery Corp.
Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.
Nipples, Air Hose.
Prime Manufacturing Co.
Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.
Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.
Nuts—(See Bolts and Nuts).
Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.
Nuts, Tank Hose.
Prime Manufacturing Co., The.
Office Appliances.
Remington-Rand Business Service.
Oils, Diesel Engine
Vacuum Oil Co.
Oil, Dynamo
Vacuum Oil Co.
Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.
Oils & Greases, Engine
Vacuum Oil Co.
Oils & Greases, Lubricating
Vacuum Oil Co.
Oils & Greases, Motor
Vacuum Oil Co.
Oil, Linseed.
National Lead Co.
Oils, Locomotive Valve
Vacuum Oil Co.
Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.
Oil, Turbine
Vacuum Oil Co.
Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.
Oxygen.
Oxweld Railroad Service Co., The.
Packing.
Westinghouse Air Brake Co.
Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Packing, Asbestos.
Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.
Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Ring Boiler.
Union Asbestos & Rubber Co.
Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.
Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.
Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paint, Powder.
Aluminum Co. of America.
Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.
Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paper, Carbon.
Remington-Rand Business Service.
Paper, Sheathing.
Carey & Co., Philip, The.
Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.
Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pickling Equipment, Monel Metal.
International Nickel Co., The.
Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company
Piling, Wood.
National Lumber & Creosoting Co.
Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.
Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.
Pins, Air Brake & Clevis.
Champion Rivet Co.
Pins, Center.
Miner, W. H.
Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.
Pipe, Corrugated Iron
Armco Culvert Manufacturers Association
Pipe, Paved Invert
Armco Culvert Manufacturers Association
Pipe Coverings.
Carey & Co., Philip, The
Johns-Manville Corp.
Keasby & Mattison Co.
Pipe Fittings—(See Fittings, Pipe).
Pipe, Metal Culvert.
Armco Railroad Sales Co
American Sheet & Tin Plate Co.
Republic Steel Corp.
Pipe, Perforated Iron
Armco Culvert Manufacturers Association
Pipe, Spiral Welded.
Armco Railroad Sales Co
Pipe, Steel Signal.
National Tube Co.
Pipe, Spiral Welded.
Armco Railroad Sales Co
Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.
Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.
Plates.
Steel Car Forge Co.
Plates, Follower.
Steel Car Forge Co.
Plates, Boiler, Firebox—(See Steel Firebox).
Plates, Center—(See Bearings, Center).
Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.
Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.
Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.
Plates, Tin and Terne.
American Sheet & Tin Plate Co.
Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.
Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.
Plows, Railroad and Grading.
Western Wheeled Scraper Co.
Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.
Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Pneumatic Tools.
Ingersoll-Rand Co.
Poles, Creosoted.
National Lumber & Creosoting Co.
Poles, Power Distribution.
National Lumber & Creosoting Co.
Poles, Preservatively Treated.
National Lumber & Creosoting Co.
Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co
Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.
Poles, Telegraph.
National Lumber & Creosoting Co.
Poles, Transmission.
National Lumber & Creosoting Co.
Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Poles, Wood
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Posts, Farm.
National Lumber & Creosoting Co.
Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co
Posts, Highway.
National Lumber & Creosoting Co.
Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.
Posts, Wood.
National Lumber & Creosoting Co.
Powder, Blasting—(See Explosives).
Powdered Coal Equipment.
Muhlfeld, John E.
Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.
Power Transmission Supplies.
Sellers & Co., Inc., Wm.
Preservatives, Wood.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.
Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.
Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.
Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm.
Pulverizers, Coal — (See Crushers, Coal).
Pumping Stations.
Fairbanks-Morse & Co.
Pump Liners, Monel Metal.
International Nickel Co., The.
Pump Rods, Monel Metal.
International Nickel Co., The.
Pump Shafts, Monel Metal.
International Nickel Co., The.
Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.
Poles, Creosoted.
National Lumber & Creosoting Co.
Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Punching and Shearing Machines.
Ryerson & Son, Joseph T.
Pushers, Coal.
Standard Stoker Co.
Pyrometers, Superheated Steam.
Superheater Co., The.
Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.
Rail-Bonds.
American Steel & Wire Co
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg Co.
Rail Braces — (See Braces, Rail).
Rail Reclamation Equipment.
Ryerson & Son, Joseph T
Railroad Shops.
United Engineers & Constructors, Inc.
Rail Splice Plates — (See Joints, Rail).
Railroad Structures — (See Engineers and Contractors; also Building).
Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.
Railway Signals.
General Electric Supply Corp.
Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.
Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Recorders, Speed & Cut-off.
Valve Pilot Co.
Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Reducing Valves.
Vapor Car Heating Co., Inc.
Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Refrigerators.
Wine Railway Appliance Co.
Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Joseph T

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication).

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding., Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America.

Slabs, Concrete Floor.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm.

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Solder.
National Bearing Metals Corp.
Ryerson & Son, Inc., Joseph T.
Westinghouse Elec. & Mfg. Co.

Spark Arresters.
Locomotive Firebox Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co.
Baldwin Locomotive Works, The.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
Pittsburgh Spring & Steel Co.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Ewald Iron Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
Orton Crane & Shovel Co.

Steel Alloy.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Republic Steel Corp.
Standard Steel Works Co.

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co.

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg. Corp.

Steel, Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.
Ryerson & Son, Joseph T.

Step Joints.
Q & C Co., The.
Rail Joint Co.

Steps, Car—(See Car Steps, Safety).

Stokers, Locomotive.
Lower Stoker Co.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg. Co.

Stoker Repair Parts.
Lower Stoker Co.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Strainers, Tank Hose.
Prime Mfg. Co., The.

Stringers, Bridge, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co.

Switch Movements.
Union Switch & Signal Co.

Switch Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Switches & Switch Stands.
Ramapo Ajax Corp.

Syphons, Corrugated Iron.
Republic Steel Corp.

Syphons, Locomotive.
Locomotive Firebox Co.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tamping Machines, Tie.
Ingersoll-Rand Co.

Tamping Outfits, Tie.
Ingersoll-Rand Co.

Tank Cars.
General American Tank Car Corp., The.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks, Air, Gas, Oil and Water.
Baldwin Locomotive Works, The.
Graver Tank & Mfg. Corp.

Tanks, Water.
American Bridge Co.
American Locomotive Co.
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Treatment Water—(See Water Softening and Purifying).

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Welding and Cutting Apparatus—(See Cutting and Welding Apparatus).

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Anaconda Wire & Cable Co.
Graybar Electric Co.

Wire, Welding.
American Steel & Wire Co.
Oxweld Railroad Service Co., The.

Wiring Appliances.
Pyle-National Co.

Wood, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Wood Preservative — (See Preservative, Wood).

Wood. Preservative Treatment (Zinc Meta Arsenite).
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National Lumber & Creosoting Co.

Wrecking Cranes — (See Cranes, Wrecking).

Z M A Wood Preservative (Zinc Meta Arsenite).
Curtin-Howe Corp.

Index To Advertisers

A

Allegheny Steel Co. 46
American Arch Co., Inc., The 33
American Brake Shoe & Foundry Co. 28
American Bridge Co. 27
American Creosoting Co. .. 2
American Locomotive Co... 34
American Sheet & Tin Plate Co. 36
American Steel Foundries.. 9
American Throttle Co. 43
Armco Railroad Sales Co. 15
Ashton Valve Co., The 46

B

Baldwin Locomotive Works, The 14
Battey & Kipp, Inc. 48
Bethlehem Steel Co. 17
Bird-Archer Co., The 44
Bixby, Inc., R. W. 48
Buffalo Brake Beam Co. .. 46
Buyers' Index ...49 to 55 incl.

C

Camel Co. 47
Chase & Co., L. C. 16
Curtin-Howe Corp. 45
Classified Advertisements.. 48

E

Edgewater Steel Co. 6, 7

F

Fairbanks-Morse & Co. ... 19
Falls Hollow Stayboit Co... 46
Firebar Corporation 38
Franklin Railway Supply Co., Inc. 32

G

General Electric Co..... 8
Get Together Department .. 48
Graver Tank & Mfg. Corp. 45
Gulick-Henderson Co. 48

H

Harbison-Walker Refractories Co. 33
Hunt Co., Robert W. 48
Hunt-Spilier Mfg. Corp. .. 39
Hutchins Car Roofing Co.. 30
Hyman-Michaels Co. 48

I

Illinois Steel Co. 35
Industrial Brownhoist Corp. 4
Iron & Steel Products, Inc. 48

J

Johns-Manville Corp. 12, 13

K

Kerite Insulated Wire & Cable Co., The 44

L

Lima Locomotive Works, Inc. 31
Locomotive Finished Material Co. 46

M

Magnus Co. 44
Midvale Co., The 18
Mt. Vernon Car Co. 47
Miner, Inc., W. H. 3
Muhlfeld, John E. 48

N

National Lumber & Creosoting Co. 21
Nichols & Bro., Geo. P. .. 46

O

Ohio Locomotive Crane Co. 47
Oxweld Railroad Service Co. 20

P

P & M Co., The 46
Permutit Co., The 23
Pittsburgh Testing Laboratory 48
Professional Directory 48

R

Rail Joint Co., The 23
Railroad Supply Co., The.. 46
Railway Educational Bureau, The 48
Republic Steel Corp. 37
Ryerson & Son, Inc., Jos. T. 46

S

S K F Industries, Inc.....10, 11
Standard Car Truck Co. .. 47
Standard Steel Works Co... 58
Standard Stoker Co., The.. 42
Stucki Co., A. 46
Superheater Co., The 40

T

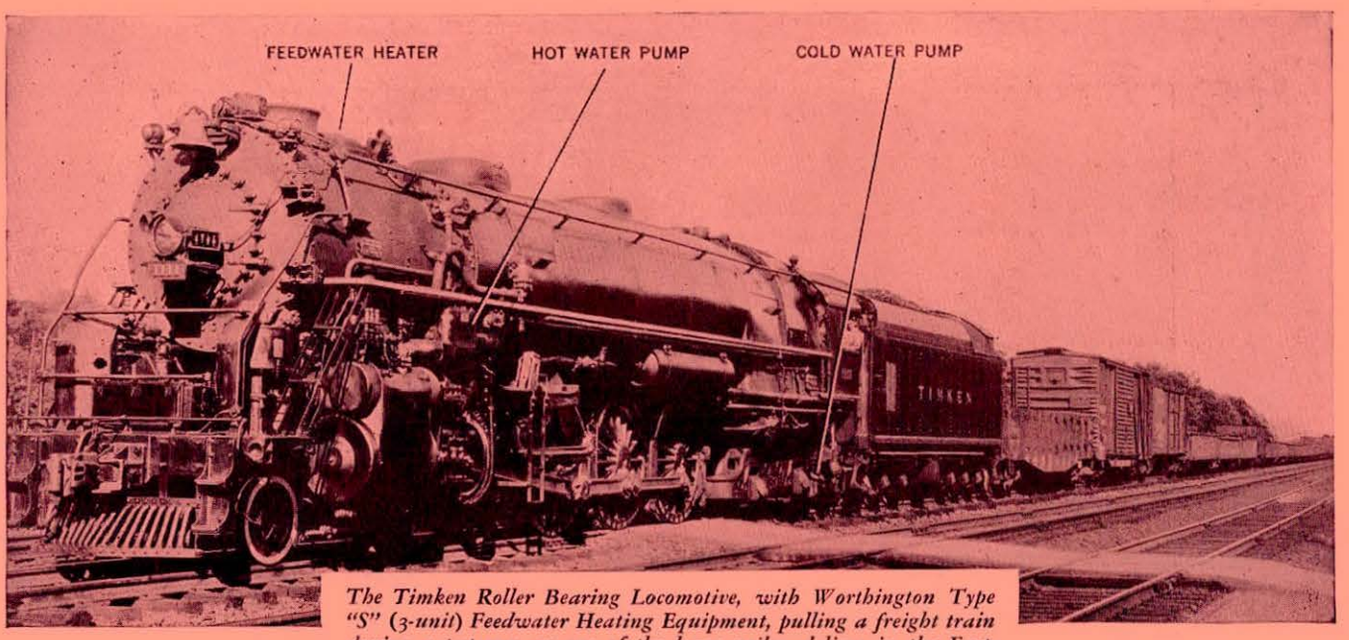
Timken Roller Bearing Co., The 25
Tuco Products Corp. 46

U

Union Asbestos & Rubber Co. 46
Union Metal Products Co... 24
Union Spring & Mfg. Co... 46
Union Steel Casting Co. .. 46

W

West Disinfecting Co. 44
Western Electric Co. 29
Western Wheeled Scraper Co. 46
Westinghouse Air Brake Co. 41
Wine Railway Appliance Co., The 46
Wood Conversion Co. 26
Worthington Pump & Machinery Corp. 57



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